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The Beattie-Smith Lectures.[1]

(UNIVERSITY OF MELBOURNE.)

LECTURE II: DEPRESSIVE MENTAL ILLNESS.

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A constant appeal to facts therefore is necessary.

—MICHAEL FARADAY, London, 1842.

AN unfortunate aspect of terminology in psychiatry is that the same word may have a different meaning in popular speech. During the war I was asked by a high-ranking physician how I knew that my patients suffered from morbid anxiety and not from cowardice. I told him that the difference between morbid anxiety and normal situational anxiety was the same as between dyspnœa and breathlessness. Yet some pathological states in clinical psychiatry cannot be described easily because they are total entities involving the whole person. If the thermometer had never been invented, fever might have provided difficulties in definition to the physician, who might have had to be content with saying that the patient was suffering from "a state of heat". Depression in a medical sense is a state involving the whole person. The term does not mean the "sadness" of popular speech, for depressed patients are not necessarily sad, but may be perplexed, confused or determined to end their lives with a determination which has to be seen to be believed. The common notion of equating the psychiatric use of the word "depression" with the popular notion of "sadness" prompts the common mistake in clinical psychiatry of taking depression too lightly. Depression in a medical sense does not mean sadness. The use of the word in economics might be a nearer parallel to its correct use in psychiatry, but it is not quite accurate because medical depression does not necessarily mean depletion. A much nearer parallel is Pavlov's concept of inhibition.

The uncharitable tendency of general hospitals not to take "that sort of case" prevents practitioner, medical student and public from learning much about them. Soon criteria for admission to any hospital will resemble those for a beauty contest. Furthermore, the average practitioner and nurse think that the admission of a patient with a depressive state to a hospital bed is a waste of time, because when they are depressed they "pull themselves together" or have a few drinks and go to the pictures.

Telling the patient with medical depression to "use will power" is more damaging than moving the car with the

[1] Delivered at Melbourne on May 5 and 12, 1952.

self-starter when the engine is dead. The concept of depression is not quite that of depletion, although after influenza and notably dengue fever a pronounced depression may occur which may make the convalescence more incapacitating than the fever. The analogy with Pavlov's inhibition is most pronounced in the more severe depression seen in mental hospitals. The patient is retarded in thought and movement; the difficulty in thinking is severe, giving rise to sadness, perplexity, confusion or deep stupor, and all physiological activity is slowed to a minimum. In clinical psychiatry the ability to discern minor degrees of psychomotor retardation is of the utmost importance apart from the recognition of a true depressive component in any type of illness. Retardation is probably the most important signal in warning the clinician that he is facing a major psychosis of some type. An important group of cerebral tumours have no localizing signs of importance, the first sign being the onset of mental changes. The unproductive apathy of frontal lobe impairment can be recognized by the experienced clinical psychiatrist. It differs from the retardation of depression, as there is a sense of deficit and inability to initiate. It is well shown in psychometric tests, which are a more accurate assessment than clinical impressions. Their increased use might lead to more accurate diagnosis in neurosurgery.

A woman, aged sixty years, had been in deep mourning since the tragic death of her son, ten years earlier. With each year she developed more features of psychotic depression and had to be nursed like an invalid. Her daughter said that whenever she stayed with relatives she did not like she became incontinent of urine and fæces, but not at her daughter's home. Two features cut across the diagnosis of melancholia: firstly, she slept well, almost excessively, and secondly, her retardation of thought disappeared once the stream of thinking was initiated. A huge frontal lobe meningioma was successfully removed by a neurosurgeon. Neurological signs had revealed no abnormality in the past, but an arteriogram after a factual clinical psychiatric diagnosis showed the tumour accurately.

Of course general paralysis of the insane and other conditions may present similarly, and if the student wants to acquire clinical discernment in such cases he ought to spend time with patients previously subjected to leucotomy, in whom the feature of unproductive apathy is pronounced. Sir Charles Symonds once said to me: "All neurologists should study in mental hospitals and all psychiatrists learn to use an ophthalmoscope." In psychotic depression the tongue is furred, appetite and sleep are gone, and the facial expression varies between misery and lack of any expression. The general posture is one of flexion and loss of movement. The clinician senses the absence of the inner activity and active negativism of the mute or stuporose schizophrenic. The pulse is slow, the blood pressure is sometimes conspicuously low and the bowels are confined for weeks. A curious feature is the development of a lemon-yellow pallor, for which I have known marrow biopsy to be performed. The patient's mind may be dominated by a single self-accusatory delusion or by the delusion of incurable disease. Freud states: "Even in descriptive psychiatry the definition of melancholia is uncertain, it takes on various clinical forms (some of them suggesting somatic rather than psychogenic affections) that do not seem definitely to warrant a reduction to unity."

He then embarks on a comparison of the reactive depression exemplified by mourning with the endogenous depression of melancholia, and remarks that the influences which usually produce mourning may occasionally produce melancholia "in some people, whom we consequently suspect of a morbid pathological disposition". It is interesting to compare the writings of Freud with the factual writings of a scientist. Freud straddles his objective with hints on constitution and then zig-zags in to spin his central theory. He prefaces this paper, which he wrote in 1917, with the observation that "our material here is limited to a small number of cases, the psychogenic nature of which was indisputable". The ancient term melancholia differs vastly in meaning from its popular usage, implying in psychiatry a severe mental illness with true depressions and delusions. There is nothing poetic about psychotic depression. In the days of "Cardiazol" treatment some psychiatrists will recall a rarity in which deep psychotic depression was converted into its very antithesis by one convulsion, as if Pavlov's notion of inhibition was converted into a state of excitation with exaltation, flight of ideas, and a physiological *tempo* which knows no rest. When Freud speaks of the melancholic being inhibited, he uses the term inhibition in a psychological sense one moment and in a physiological sense in the next. He mentions the "inhibition of all activity" in the melancholic and then says: "It is easy to see that this inhibition and circumscription in the ego is the expression of an exclusive devotion to its mourning." Hence it is important to understand what Pavlov meant by his physiological concept of inhibition, for his experiments throw much light on brain physiology. If the cerebral cortex has the analysing, discriminative and synthesizing functions which his experiments demonstrate so clearly in animals, it is easy to understand how mental conflict can tax these functions until overt psychoneurotic or psychotic symptoms develop. The full significance of Pavlov's work as applied to psychiatry is not given the emphasis it deserves.

Professor Ivan Pavlov was born in Russia in 1846 and knew poverty and hardships. He was so absorbed in the physiology of the nervous system that he failed in medicine. He seemed to have no interest in anything except research, and the academicians thought he was an awful nuisance. His sister-in-law lent enough money for his honeymoon, after which his wife did everything for him, even buying his clothes and boots, because he would not leave his research. His appointment as professor of physiology was not confirmed for two years because he disagreed with his superiors. In 1904 he won the Nobel Prize for his work on digestion. His enemies jeered at him and said that his work was "what every dog-trainer knew long ago". He opposed both the Tsarist and the Soviet *régimes*, but his international renown led the Soviet to build fine laboratories and encourage his work. At the age of eighty-six years he addressed a congress of neurologists at London. It has always seemed to me that not only do Pavlov's experiments throw light on the function of the cerebral cortex, but they have the great virtue of being carried out under nearly natural conditions. Experimental neuroses have been produced in animals, and it is of considerable interest that they are easier to produce than to cure. Unlike the human, the animal is unable to exteriorize the conflicting cortical pattern, and treatment consists of prolonged rest to allow extinction, and even this is only a temporary cure. I do not think the highest ape would ever go into a recruiting centre after hearing a bomb fall, even if he had graduated from the most exclusive jungle and had expensive psychiatric treatment. In the light of Pavlov's work the action of psychotherapeutic techniques and other psychiatric procedures such as abreaction becomes clearer. Self-awareness enables the human to seek treatment, but Pavlov's dog might carry its pattern for life.

Freud's care in differentiating endogenous or psychotic depression from reactive depression at the commencement of his paper on mourning and melancholia is lost as his thoughts unfold and he outlines his psychogenic theory of melancholia as being "a process of regression from narcissistic object-choice to narcissism". He states: "The self-torments of melancholics which are without doubt pleasurable, signify, just like the corresponding phenomenon in the obsessional neurosis, a gratification of sadistic tendencies and of hate, both of which relate to an object and in this way have both been turned round upon the self." Freud postulates an object choice to which the libido is attached, then the withdrawal of the libido to the ego because of the loss of the object, then the identification of the ego with the abandoned object. According to Freud, the incorporation of the lost object into the ego gives rise to a cleavage between the criticizing faculty of the ego and the ego as altered by the identification. This, according to Freud, is the basis of self-hate in melancholia. He has to postulate other mechanisms by which this final state of self-hate is reached, and has to explain why the libido, having lost its object in the first place, was not simply transferred to a new object, and also how a strong fixation to the love-object can be withdrawn so readily to the

ego after the object has been lost. Otto Rank supplied an explanation of this last objection by stating that the choice was made initially on a narcissistic basis.

Glover puts the Freudian viewpoint for a primary psychogenesis in depression thus:

> He lives in a mental prison with those objects, hating them in himself and thereby hating himself. By so doing he reinforces the primitive aspects of his super-ego, heaping on himself reproaches which are really directed against the objects he formerly loved but who have now become worthless to him.

Now the whole of this elaborate theory in Freudian language is built around Freud's premise in his paper, in which he states that "in the clinical picture of melancholia, dissatisfaction with self on moral grounds is far the most outstanding feature". But the most outstanding feature is not "dissatisfaction with self on moral grounds" but the presence of a delusion, of which such thoughts may be the formal content. There is a wide gulf between the "dissatisfaction with self" of the delusional melancholic and that of the non-psychotic person. Instead of a self-accusatory delusion of guilt the melancholic may present with a delusion of alteration or of incurable disease in a portion of his body. Now the psychoneurotic may have ideas of bodily disease, but they lack the depth of the bodily delusion and are amenable to reassurance and later to psychotherapy.

When the belief of the melancholic patient is bizarre its delusional nature is quickly recognized, but often the belief of incurable disease is socially acceptable. A middle-aged man, successful in business, direct in manner and not given to abstractions, and with the stocky pyknic physique acceptable in most clubs, has been noticed by his associates to be taciturn and preoccupied with thoughts of illness. He is certain that he has heart disease despite examination and reassurance by various doctors, and perhaps months later commits suicide. A major mental illness remains undiagnosed, because its presentation was socially acceptable. In clinical psychiatry it is the deep conviction of incurability which should put the clinician on his guard. It is not the formal content nor the context which reveals the delusional nature of the belief, but its depth and the degree to which it motivates the conduct of the patient. The clinical setting, revealing retardation of thought and movement, insomnia and exhaustion help to indicate the endogenous depressive basis of the illness. Some bodily delusions may be illusions based on unusual somatic sensations arising from the inhibitory process, and this may account for disturbances of the body image, such as the belief that the head is growing larger or smaller. But I would not over-emphasize this, because sometimes the delusion of incurable bodily change is projected to another person—a motive for putting the loved one out of misery. So you see the love and hate aspects are not so fanciful. Freudianism invites considered, not hasty, criticism.

There are many variants in the manic-depressive and involutional melancholic group, and among the most interesting are those associated with apathy, depersonalization and cephalic paræsthesia, the latter giving rise to the belief that the brain is shrunken or dead. In building on the formal content of a psychosis Freud follows the familiar path of those who would construct a psychogenesis from what the psychotic patient says. After hearing the string of mechanisms in the Haigh trial, the aged judge turned to the psychiatrist who had obtained all these details from the accused, and reminded him that he had already defined the paranoic as an unreliable person. Between mourning and melancholia is a gulf which separates a deep normal reaction to stress and a reaction in which the patient is divorced from reality and in which his ego is overwhelmed by delusional and sometimes hallucinatory material. It is true that melancholia and other psychoses are precipitated by bereavements, but the association may be due to the fact that the deaths of loved ones are the commonest stresses to which the human is subjected. An attack of mania with elation and psychotic joyousness may be precipitated, while in the majority of people there is naught but deep grief. Had Freud lived to see the introduction of electroconvulsive therapy he would have seen the psychotic depression converted rapidly into a state of well-being. Fenichel pays scant attention to periodicity, spontaneous remissions and the role of heredity in the manic-depressive psychoses, and he concludes this opinion by saying that "psychoanalytic study makes it probable that this constitution [that is, manic-depressive] consists in a relative predominance of oral eroticism". To many clinical psychiatrists the Freudian theories of psychotic depression are fragmentary and have led to no therapeutic benefits comparable with modern physical treatments. Yet as the gradation from psychotic depression to the purest forms of reactive depression are followed, the role of a psychogenesis becomes increasingly important and psychotherapeutic techniques of correspondingly increasing importance in therapy.

At this juncture the value of situational measures apart from psychotherapy should be indicated. When the physical components of psychotic depression are dealt with by electroconvulsive therapy and the psychological aspects by psychotherapy, of what use is it returning a widowed menopausal woman to the loneliness of her house and to social and financial insecurity?

The role of current external stresses is minimized by Freudians and physical treatment enthusiasts; yet the high relapse rate in depressive states is often due to social stresses. Nothing is more damaging than the intersection of two or more current external stresses, from differing instinctive spheres, at a vulnerable point in the development of the individual. Yet vulnerable points such as puberty, the menopause or the senile period need not be invoked if the external stress is severe enough. We have all seen the man, sustaining Herculean stress in combat, broken by the news from home. Freudians say that they work through these stresses in the initial stages of therapy; but I often wonder how the young psychoanalyst can have enough general and cultural knowledge to interpret the outer layers of a psychoneurosis, in which current external stresses predominate. The court martial scene in the recent American novel, "The Caine Mutiny", is not overdrawn. Hence in the ætiology of depression the role of social stresses should not be minimized, and particularly at the psychotic end of the scale, constitutional factors seem to be of primary importance. But the fact remains that even in the latter, psychogenic factors commonly precipitate the psychosis. Many psychiatrists seem to be uninterested in a non-specific psychogenesis, and yet there is probably no disorder in the whole range of medicine and surgery without its psychoneurotic component. The notion that any combination of psychogenic factors may precipitate a pathological condition is well known in medicine, in which psychogenic stress takes its place with trauma and infection. No modern orthopædic surgeon thinks that mere anatomical continuity will guarantee recovery of function, and rehabilitation programmes are an essential part of his treatment. However, in psychiatry there is much disinclination to limit the role of a psychogenesis to that of a non-specific stress. Desperate attempts are made to produce a primary psychogenesis to explain the whole condition at all costs. Adler proposes a primary psychogenesis for melancholia, which is much inferior as a theory to that of Freud.

Adler states that "melancholia develops among individuals whose method of living has, from early childhood, been dependent upon the acts and the aid of others", and that "melancholia thus like every neurosis and psychosis helps the patient's object of heightening the social value of his own will and personality, at least in his own opinion". Adler says that "the most prominent offensive weapon of the melancholic type which he uses for raising his position, and which he has employed from childhood on, consists in complaints, tears and depression". This primary psychogenic theory in terms of "the will to power" is contrary to the facts of psychotic depression. The vehemence with which Freud, Jung and Adler pursue a primary psychogenesis has had a twofold effect on psychiatry. Firstly, such vehemence has hindered a total or what Meyer called a psychobiological approach, and secondly it has prevented practitioners from developing independent techniques in psychotherapy devoid of pre-

conceived notions. Hereditary and constitutional factors have always been invoked in the manic-depressive psychoses, Rudin stating that its incidence is twenty-five times as high among siblings of manic-depressive patients as in the general population, the uniovular twin being affected in more than 50% of cases. However, Slater has quoted Bleuler as stating that the achievements of psychiatric genetics must be regarded as very modest. There is some evidence to suggest that genetic studies in psychiatry fail because of the assumption that the accepted divisions of the major psychoses are really separate disease entities. In 1896 Kraepelin differentiated the manic-depressive group of disorders from the schizophrenias, but many observers before him noted alternating phases of depression and mania in some mental illnesses. Thus Aretæus of Cappadocia in the first century A.D. and Paul of Ægina in the seventh century, also grouped mania with depression. Classical circular insanity with alternating phases of mania and depression is rare compared with the many variants of the manic-depressive group, some patients being subject to episodic mania or depression without any alternation. Kraepelin's demarcation of these disorders from his *dementia præcox* group met with opposition from psychiatrists such as Mendel (1839-1907), who demonstrated depressive and manic features in paranoia.

Pure psychotic reactions corresponding to the classical types are not so common as those with mixed features, and the manic-depressive and schizophrenic groups do not represent mutually exclusive categories but seem to form a continuum, and today we have the legacy of this at clinical meetings, when an argument ensues as to whether the patient is suffering from paranoia with depression or from depression with paranoia. A far more practical approach is to accept the mixture and evaluate its varying components for the purposes of treatment and prognosis. Hence, pursuing genetic studies in the hope of finding the psychosis "breeding pure" may be a waste of time. Schulz suspects that there are genetic factors common to both the schizophrenic and affective disorders, and some of his studies confirm this. Thus there may be a common ætiological factor in the major psychoses, the difference in symptomatology being due to the reactions of varying constitutions and other factors, such as the age of onset. Patients with a lifelong psychosis have been known to show manic-depressive and schizophrenic features. It is not uncommon to find schizophrenia, affective psychoses and epilepsy or psychopathy in the same family group. The psychiatric geneticists who are looking for inheritance of pure diagnostic categories may be chasing a myth. In cases in which a disorder such as schizophrenia looms large in a particular family, what is inherited may be both the underlying constitution as well as the unknown pathogenic factor. The inheritance of epilepsy provides a similar problem, because it is obviously allied to other disorders, such as aggressive psychopathy and migrainous equivalents. Schulz describes 55 sibships resulting from the mating of two manic-depressive partners, in which the incidence of affective psychosis in the children was 28% and of schizophrenia 12%. The attempt to divide the major psychoses into all kinds of mutually exclusive entities may hinder research. The important thing in clinical psychiatry is to assess the interplay of components in the varying reactions.

It has been known for many years that involutional melancholia has a worse prognosis if there is an admixture of schizophrenic features. Thus bizarre hypochondriacal delusions and shallowness or incongruity of affect make the prognosis worse. Hoch and MacCurdy are quoted by Henderson and Gillespie in their survey of 67 cases, in which it was found that the average period before improvement was nine and a half months; 33 patients improved during the first year, five during the second year, one during the third year, and three during the fourth year. In the patients who did well there were much emotional reaction, great anxiety with restlessness and prominent delusions of death and poverty, while the features previously mentioned carried a poor prognosis. This study, made in 1922, conveys some idea of the natural history of involutional melancholia, and with the scattered though voluminous account of factual descriptive psychiatry, it tends to be forgotten in the enthusiasm for the splendid results of electroconvulsive therapy in involutional melancholia. Yet in many cases the disorder may still run its natural course for five years, after which a permanent improvement may occur. Hence repeated courses of electroconvulsive therapy may be necessary without recourse to leucotomy. The natural history of involutional melancholia suggests that leucotomy may be performed too soon in some cases. This brings us to the question of institutional management of mental disorders and the question of notification of mental diseases. Proper institutional care is an essential background to the treatment of a large group of psychiatric disorders, the type of involutional melancholic which runs a fairly protracted course being but one example.

There is a widespread fear of institutional life among the public which the relevant authorities must disperse. Incidentally, psychotics are not the only class of patients with psychiatric disorders needing an institutional background. There are many partially incapacitated psychoneurotics in our midst who not only need treatment but who need a background of the hostel of institutional type from which they can go to work each day. Alcoholics are only one group among such psychoneurotics; many others need removal from the lonely boarding house, or the household torn by strife, for planned psychotherapy over a period of years. Social and situational measures are as important in psychiatry as they are in other aspects of public health.

It was pointed out in the previous lecture that a scheme for notification of any major mental disorder in Australia seems a necessary prerequisite to research and to the elucidation of manpower and forensic problems. This applies particularly to depressive psychotic reactions involving risk of suicide or homicide. Unless the State and the private practitioner cooperate closely in such cases tragedies are inevitable. After-treatment, periodic supervision in the home by a medical social worker or a visiting nurse trained in psychiatry seems to be essential. I should like to stress the point again that many serious mental disorders are episodic, and the law must take this into consideration when framing laws governing certification. The clinical psychiatrist must discharge a patient when his disorder remits, even though he knows that an attempt at suicide or a homicidal episode may occur again in weeks or months. Such patients form only a small group of mental patients and should not prejudice the necessary and beneficial freedom accorded the majority. Yet in regard to this minority, whose actions clinical psychiatry can forecast approximately, we are often powerless to act. As one judgement said, it is "the sanity of husbands and not the safety of wives" which is the test of certification. We are powerless in this State to certify a patient for what he may do, although on clinical grounds there is a grave risk of his doing it.

Some intermediate process in the matter of certification seems necessary as well as an adequate process of supervision after discharge from hospital. To some extent this could be solved by an expansion of the psychiatric units in the teaching hospitals, if such hospitals were given the legal rights to detain patients for observation for a short term. It would also give the medical student and trainee nurse experience in clinical psychiatry, which often has social consequences far graver than some items dear to the heart of the academician. Thus the melancholic or endogenous depressive psychoses sometimes have an admixture of schizophrenic features and do not always respond to treatment.

In classical circular insanity there is a danger of converting the depressive phase into a manic one. Freud states that "it is not merely permissible, therefore, but incumbent upon us to extend the analytic explanation of melancholia to mania", and that "the content of mania is no different from that of melancholia, that both disorders are wrestling with the same 'complex' and that in melancholia the Ego has succumbed to it, whereas in mania it has mastered the complex or thrust it aside". Glover

states that "the cyclical form of manic depression is therefore a regression to alternating states of love and hate". He also states that "the cyclical nature of manic-depression is incidentally proof that in at least the first year and a half of life no organized super-ego exists". Yet in his attack on Jung, Glover states in reference to children under the age of two years that "the only criterion that can be applied to theories of early mental development is the extremely shaky one of plausibility". Freud's theory inverts smoothly from melancholia to mania, but he overlooks the fact that descriptive psychiatry provides mixed states corresponding to Kraepelin's six categories, in which the cardinal symptoms of psychotic depression and mania are mixed in various combinations. Thus a melancholic may have flight of ideas.

Kraepelin thought they were transitional psychotic states between mania and depression, but as Henderson and Gillespie remark, these mixed states run a prolonged course. Psychopathological theories stretched to cover these mixed states might invite a tear in the web or casuistry. On the other hand, the Pavlov theory of inhibition and excitation permits the localization and blending of these changes in various functions. Now the curious fact emerges that spaced electroconvulsive treatments will convert depressive states to normality, and that multiple electroconvulsive treatments given each day will convert mania into normality. This is consistent with Pavlov's results with ultramaximal stimulus. He stated that "a stimulus, the intensity of which is beyond the maximum, instantly elicits inhibition, thus distorting the rule of the relationship between the magnitude of the effect and the intensity of the excitation". Shoor and Adams, of San Francisco, using multiple electroconvulsive treatments, claimed to have achieved excellent results in a large group of chronic disturbed psychotics, so that over a three-month period restraint was reduced by 90%, seclusion by 66%, and sedation by 90%. The group covered 123 patients whose ages ranged from nineteen to eighty-four years. If any armchair psychopathologists have doubts about the need for such treatment, I would invite an unescorted tour of ward F7 at our Sunbury State Mental Hospital.

Fabing, of Cincinnati, replaced the technique of multiple electroconvulsive treatments with the application of electroconvulsive therapy immediately preceded by the intravenous administration of five cubic centimetres of "Coramine". This analeptic drug was injected, and the application of the electrical stimulus was delayed for a maximum period of sixty seconds, but was applied earlier if there were well-defined signs of circulatory and respiratory stimulation. There was no difference in the type or duration of the resulting convulsion. Fabing noted that restoration of respiration was invariably quicker with "Coramine" than without, and his results in cases of acute mania were excellent. He also observed that the patient slept soundly for a varying period afterwards. In a hundred cases the number of treatments averaged 7·5, while for nine acutely maniacal patients the average was 9·5 treatments. Fabing states that "no statistical summary, however, can give a picture of the dramatic suddenness with which these various forms of psychotic excitement are often allayed after as few as one or two such treatments". Twelve months later he published another note claiming "gratifying results" in 350 cases, and pointing out that thrombosis of the arm vein could be avoided if the five cubic centimetres of "Coramine" were diluted with an equal quantity of sterile distilled water in a 10 cubic centimetre syringe. Fabing claims that he is using "a chemical excitant to heighten the excitatory effect of the electrical stimulus and thus amplify it quantitatively to make it ultramaximal".

Most psychiatrists have seen mania made worse by spaced electroconvulsive treatments and mania relieved by multiple electroconvulsive treatments until the dividing line between an excitatory and inhibitory stimulus is crossed. Now it is interesting to compare Cade's work in Australia with lithium salts with the American work on ultramaximal stimulation in Pavlov's sense. In both cases we are driven back to the physiology of the nerve cells, as we are in idiopathic epilepsy. Pavlov showed that local excitation and local inhibition can be produced experimentally, a fact which may explain other forms of psychotic excitement apart from the generalized excitation of mania.

Psychotic depression is known to be worse in the mornings even after sleep, a fact which tends to link such depression with Pavlov's notion of sleep. The patient not only seems worse after a few hours' sleep, but even in the absence of sleep there seems to be a deepening of the inhibitory process. This will not refute arguments for a primary psychogenesis in depression, as some psychoneurotics torn by mental conflict wake exhausted after many hours of light sleep. Does the psychotic depressive become less depressed when he becomes hypochondriacal because of a conversion process similar to that in conversion hysteria? Yet if a patient is deeply depressed, inhibitory factors are so pronounced that he cannot be hypochondriacal. The psychopathological idea of a dynamic interchange between depth of depression and extent of hypochondriasis is likely but inferential. Confirmation may come from the fact that dissuasion may precipitate suicide. This is similar to the advice to the depressive to exercise, an intolerable physical burden, which he ends suddenly if the gymnasium is high above the street.

The term "shock treatment" is most unfortunate, as the patient having electroconvulsive therapy is not "shocked" in a physical or mental sense. It is a hideous name. Surgeons do not talk of "knifing" or "cutting", but dress their procedures with a nice Greek prefix and a suffix such as "-otomy", all of which has induced a mystical regard for the surgeon in the general public. Even unmodified electroconvulsive therapy carried slight risk only, and could be used in an out-patient department; but the addition of "Pentothal" and "Scoline" has put electroconvulsive therapy in the *de luxe* division of therapeutics. It would be no cause for wonder if Cerletti became paranoidal through neglect, for electroconvulsive therapy has relieved much human suffering throughout the whole world and yet its inventor is rarely invoked. There are no Cerletti institutes for the electrification of young psychiatrists. Older psychiatrists who saw the years of suffering of the involutional melancholic must appreciate the remarkable results of electroconvulsive therapy. I would advise a perusal of the symposium on depression held by the Royal Society of Medicine on March 23, 1951, at which Mayer-Gross, with sorrow and some anger, answered those who belittled the treatment of depression. Some patients do not get better, of course. In fact, sooner or later we all die. Karagula based his claims on the 20% who do not. My remarks on the admixture of schizophrenic features may be relevant.

Mild cases of endogenous and reactive or psychoneurotic depression are extremely common and reinforce medical incomes. Fashionable diagnoses are popular modes of presentation, and if the lucky practitioner coincides with an upward swing in the cyclothymia, he is the greatest doctor in the world.

The depressive phases are more profitable as "psychogenic rheumatism", neuralgias and the crowning glory backache, for which the operation of herniated *nucleus pulposus* is happily on the wane. When the bad posture of the depressive, and his general metabolism, and the total inhibition and stasis are considered, local physical changes are inevitable. The number of these patients undergoing physical medical therapies with heat and the coloured lights is amazing. "Fibrositis" and medical depression are not far apart. Two classes of patients with facial neuralgia are of interest to the psychiatrist. The first, in a definite depressive setting, does well with electroconvulsive therapy, while the other, in a background of hysterical psychopathy with the shadow of addiction, does badly with any form of treatment. In my opinion no patient with facial neuralgia should ever be operated upon without the opinion of a competent clinical psychiatrist. I have always held the opinion that if a surgeon lived in a large institution in close contact with his patients, as does the institutional psychiatrist, his operative surgery would be halved.

To delineate true medical depression I have omitted reference to associated features of which anxiety and agitation are common. In Moore's Speaman factor analysis of the depressive states anxiety is given considerable weight.

Leucotomy takes something from the patient which can never be restored. The justification for leucotomy, apart from the relief of suffering, is the liberation of pre-psychotic assets. It is not much use liberating unpleasant manic traits if they are conspicuous in the pre-operative assessment. Furthermore, I will never recommend a patient for leucotomy unless I am certain that the relatives will care for the patient and are not simply looking for a specialist in euthanasia. Leucotomy is an irrevocable step. The further one moves from the psychotic end of the depressive scale towards the psychoneurotic depression, the clearer Freudian mechanisms become, their application to the psychosis being made blindly on planks of supposition.

To what extent does the psychology of the normal remain applicable to the abnormal? Have the physicians finally decided on the physiology of cardiac failure? The psychopathologies of everyday life may not elucidate the psychosis.

As if to confound this thought, the woman of every out-patient clinic enters, with the pile of cards and the entries, system by system with military precision. A hysterectomy has been performed; there will be no more bleeding after that. She is exhausted, sleepless, retarded. She is widowed and childless. She mourns her husband; but her married life was most unhappy because of cruelties, alcoholism and sexual frigidity. Her attitude towards marriage was the product of a hypocritical, prurient, infertile age. At times she thought life intolerable and wished for freedom, and a skidding truck and a wet road gave it to her. She was free, but in an instant was engulfed in the hounding force of guilt and morbid anxiety. Her palpitations took her to the cardiologist, menorrhagia to the gynæcologist, dyspepsia and loss of weight to the physician, and backache to the orthopædist. One doctor lost interest when she could not furnish the third symptom of a triad. And over all the cards is a note stating that there is mild but definite spondylitis with a "functional overlay". No phrase reveals the fatuity of the physician and surgeon in the matter of psychiatry more than this one—as if an indecent psychiatric quilt was drawn over this very decent structural pathology. If morbid anxiety or depression coexists with structural pathology, surely there is a summation of components in the total reaction of the patient? Summation of such components is important in psychiatry. In 1943 Jacobs showed that a septic puerperium was relatively unimportant, that manic-depressives exceeded all other groups in the likelihood of a psychosis following childbirth, and that there were usually three precipitating factors—aversion towards childbirth and towards motherhood based on parental marital unhappiness, and the patient's sexual frigidity. It is true that the woman mourning her husband might improve with electroconvulsive therapy, but unless the adequate and relevant psychogenesis and the situational factors are dealt with the physical treatment is futile.

In directing the future of a person with irrational guilt there is no goal so beneficial as the service of others. Reactive depression in its purest form is seen after severe combat stress, and yet the same stress in another person may induce hyperexcitability. Cases which impressed me with the validity of Pavlov's theories were those in which situations of extreme danger produced sleep or drowsiness in individuals who were certainly not narcoleptic. Depression occurs in other psychoses, an example being paranoidal schizophrenia, its differentiation from schizophrenic blocking being difficult. In the manic-depressive group it has been estimated that 70% of the patients are women, although in the involutional melancholic group the preponderance is somewhat less. The emotional changes which accompany the menstrual cycle and the changes in electrolyte balance recall a severe case of recurrent mania, in which prescription of lithium salts produced the first severe depressive episode of the patient's twenty years of psychosis.

Hospital admission rates for affective psychoses are no guide to their widespread incidence in the general population. I am certain that the practitioner would diagnose many cases which now bear other labels if he grasped the total concept of medical depression, including its associated aspects of difficulty in thinking and exhaustion. The old term neurasthenia is probably of less account today because of the increased recognition of depression. The concepts of depression and cyclothymia extend outside psychiatry to wider fields of human activity. Medical depression is one of the fundamental clinical psychiatric entities to which medical student and trainee nurse ought to be introduced early in their careers. It has a more serious import for the human race than "bundle branch block" or even recurrent laryngitis.

The psychoanalyst Clifford Scott found 48 patients out of a total of 67 endogenous depressives suitable for psychoanalysis and analysed 18 of the patients himself. He claims to have achieved good results in 14 and poor results in four. Of course he is in the same position as any other practitioner confronted by the cyclothymic tendency to sudden remissions and relapses. The figures furnished by the practitioner who lines up his patients as far as the street and gives them injections at the taxpayers' expense might also be interesting.

I am convinced of the necessity for psychotherapy in depression, but am cautious of its extent and its results. In his book of 1933 Henry Devine lists an extraordinary number of things which supposedly produce remissions in mental diseases. Depression, like other aspects of factual descriptive psychiatry, must be presented to the medical student and nurse in the form of the all too numerous case material, and not be a speculative anecdotal lecture from the dais. Why cannot nurse and student do part of their training in the mental hospitals? There is a wealth of physical signs and organic pathological material there. It will be a great day for the mental hospitals when the physicians, surgeons and practitioners of the impersonal specialities enter the wards of the mental hospitals. There could be a special cloak-room for their robes. In my travels I have seen doctors, lacking nothing except psychiatric knowledge, ridiculing psychiatric patients in front of students and nurses. There is no greater crime in medicine than to treat the patient with true medical depression abruptly or harshly, for suicide in such cases is as humiliating for the clinician as peritonitis in an undiagnosed stomachache. There is only one place to learn clinical psychiatry, and that is in the mental hospitals. As I see practitioners stalking about this city I think of the isolation of that splendid clinical psychiatrist at Royal Park, Dr. Ramsay Webb, and his reception of any type of mental disorder from cerebral tumours to adolescent schizophrenias. And then I see a large parcel of students straining to hear whether the cardiac murmur is in systole or diastole, whereas their first night in general practice might bring them a schizophrenic, an alcoholic and young married people in sexual difficulties—the happy inertia of academic learning. What Galen said went on for centuries.

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VACCINATION AGAINST TUBERCULOSIS WITH B.C.G. VACCINE.[1]

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IN 1902 Nocard, a French bacteriologist, isolated a strain of *Mycobacterium tuberculosis* from the udder of a tuberculous cow. Partly because of the ease with which this strain could be emulsified to form a relatively homogeneous suspension, it was kept for several years as a standard laboratory strain of the bovine tubercle bacillus. After repeated serial passage it gradually lost its initial virulence, a common enough occurrence when any species of pathogenic bacterium is repeatedly passed on culture media without passing through the animal body, and one which has since been observed on many occasions with other strains of tubercle bacilli.

Calmette, who had been working with this Nocard strain of bovine tubercle bacilli, thought that this loss of virulence—or attenuation, as Pasteur had first called the process—might render the strain useful for protective vaccination against tuberculosis. In 1908 he and a veterinary colleague called Guérin commenced systematic passage of the Nocard strain on a glycerin-bile-potato medium, and made regular observations of the virulence of the organism. After 30 passages it became innocuous for calves, and later it lost its virulence for monkeys. By 1919 he judged it incapable of producing progressive tuberculosis in any laboratory animal, and a number of experiments upon guinea-pigs and cattle showed that it produced increased resistance to subsequent infection with virulent tubercle bacilli. In 1922 it was administered orally to new-born infants, and as no harm resulted, use of the vaccine, which by this time had been designated B.C.G. (*Bacille Calmette-Guérin*), spread rapidly through France and other parts of Europe. The reputation of Calmette as an authority on tuberculosis was so high and his advocacy of B.C.G. so persistent and vigorous that controlled experiments in humans were deemed unnecessary. Setbacks occurred, however, especially the Lübeck disaster in 1930, owing to contamination of B.C.G. with a virulent tubercle bacillus, and with Calmette's death in 1933 enthusiasm for the vaccine waned, even in France. Renewed interest in B.C.G. is due to the more scientific approach of Scandinavian investigators during the last twenty years, and there is now sound evidence of the efficacy of B.C.G. in certain epidemiological situations. Since the end of the last war, much valuable experience has been accumulated by the Joint Enterprise, which has vaccinated millions of individuals in many countries.

Such, briefly, is the history of B.C.G. Tonight I will try to assess some aspects of the preparation and use of B.C.G. in the light of modern knowledge of the biology of tubercle bacilli—knowledge which has grown enormously since the routine preparative ritual was laid down by Calmette over twenty years ago.

The magnitude of the subject precludes any discussion of the theoretical basis of vaccination—that is, the mechanism of acquired immunity to tuberculosis—or any detailed account of the evidence upon which rests belief in its value in the prevention of tuberculosis in man. I will confine myself to a number of bacteriological problems and to a brief account of some of the more recent evidence of the efficacy of B.C.G. vaccine.

First, what are the theoretical requirements in a vaccine of living attenuated tubercle bacilli, and how does B.C.G. measure up to these? We shall assume that its immunizing potency is satisfactory, and we find then that the theoretical requirements hinge upon the word "living". It is obvious that the virulence of the strain is of major importance. It must be sufficiently high to allow some degree of multiplication to occur in the vaccinated host—otherwise one might better administer a killed vaccine; and it must not be high enough to cause severe local lesions or general symptoms, or progressive tuberculosis, whatever the nutritional status and general health of the vaccinated individual. The virulence needs to be nicely balanced—intermediate between the completely avirulent tubercle bacilli and fully virulent strains. Next, since it is a living vaccine, we must pay attention to the viability of the bacterial cells of which it consists; it must contain as high a proportion as possible of living bacteria in a uniform physiological condition. Thirdly, it must be pure, i.e., tests must be carried out to ensure its freedom from contaminating bacteria.

The requirements, then, are proper virulence, high viability, physiological uniformity, and purity. And from the bacteriologist's point of view we must also consider how we are going to maintain the strain in this ideal state over the years.

There have been fierce and highly emotional controversies about the virulence of B.C.G. Until very recently, the methods used for determining the virulence of tubercle bacilli have been quite unsatisfactory—unsatisfactory, that is, for the fine type of comparisons required in assessing an agent such as B.C.G., which is neither fully virulent, in that it does not cause progressive disease in normal mammals, nor completely avirulent, in that it does not completely fail to muitiply in them. With closer attention to accurate standardization of the genetic background and physiological state of the host animal, and the viability, physiological state and degree of dispersion of the inoculated bacteria, some progress has been recently been reported in the measurement of the virulence of B.C.G.

Two types of experiment may be quoted. Firstly, if mice are inoculated intravenously with large doses of tubercle bacilli, one of four results is observed: (i) virulent strain, young culture, septicæmic death in two or three weeks; (ii) virulent strain, older culture, death with lung lesions in four to seven weeks; (iii) B.C.G. (attenuated strain), no general symptoms, but definite small foci in lungs; (iv) avirulent strain, no general symptoms, no foci in lungs. Secondly, if normal guinea-pigs are inoculated with virulent tubercle bacilli they eventually die of tuberculosis. If they are inoculated with B.C.G. or avirulent strains, no progressive lesions develop. But if guinea-pigs are first rendered silicotic by the inhalation of silica dust and then inoculated with B.C.G., progressive and finally fatal tuberculosis occurs, whereas the avirulent strains again fail to produce disease.

B.C.G. thus has a degree of virulence intermediate between the fully virulent and the completely avirulent strains. Substrains of B.C.G. from different parts of the world are remarkably uniform in this intermediate degree of virulence, although on a number of occasions further loss of virulence, and hence of vaccinating potency, has undoubtedly occurred. During the last twenty years there has been no evidence of any enhancement of the virulence of B:C.G. The problem of maintaining virulence at the desired level is now easily solved by the use of freeze-dried cultures, although as yet few B.C.G. laboratories use such methods.

It is obvious that the viability of a living vaccine, or its "expectation of life", is of the greatest importance. Nevertheless, there have been few studies of the viability of B.C.G. vaccine, and it is a sad reflection upon those engaged in B.C.G. production that they have to label their product with an expiry date ten days after the date if issue.

Several factors may enter into the viability of B.C.G. First, viability under standard conditions may be governed by the genetic constitution of the organism, just as virulence is. No investigations have been made with clones of B.C.G.—that is, populations derived from single micro-organisms—but Dubos has recently found that substrains of B.C.G. obtained from different laboratories in the United States of America differ greatly in their viability under the same conditions, as well as in their virulence.

The mode of growth and preparation of the vaccine may also condition its viability. The classic method of growth of B.C.G. as a surface pellicle deprives a considerable proportion of the organisms of access to oxygen and nutrients, and many of the organisms in such pellicles are actually dead. To this initial heterogeneity is added the mechanical

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on July 31, 1952.

trauma of grinding with steel balls to prepare a dispersed suspension. On the other hand, dispersed growth in the depths of Dubos's liquid Tween-albumin medium produces a culture in which some 90% of the cells, which have developed under uniform physiological conditions, are alive.

Whichever method of preparation is used, the vaccine initially contains up to 100,000,000 living organisms per millilitre or per milligramme dry weight, but in the standard vaccine prepared and suspended in the classical manner the viable organism count drops extremely rapidly. One group of investigators found that the vaccine consisted entirely of dead organisms after only ten days. In experiments carried out here with the Commonwealth Serum Laboratories vaccine the results were better than this, but over 99% of the cells were dead in eighteen days and 99·99% in twenty-six days. With this may be compared the viable organism counts obtained with a vaccine consisting of the same substrain of B.C.G. grown in Dubos liquid medium and stored in that medium. The viable organism count was at the same high level of over 100,000,000 per millilitre at ten weeks, as was found at four days after preparation, whether the culture was stored at refrigerator or at room temperature.

Originally I believed that this great difference was due principally to the protective action of the albumin contained in Dubos's medium, but later experiments suggested that it was dependent rather upon the mode of growth of the organisms and the preparation of the suspension than upon the suspending fluid. A recent investigation (Edwards and Tolderlund, 1952), sponsored by the Tuberculosis Research Office of the World Health Organization, has shown the deleterious effect of sunlight on the vaccine. Exposure to direct sunlight of bottles of vaccine placed on an iceblock resulted in a thousandfold reduction in the viable organism count within an hour. Experiments with the same type of vaccine showed that it was relatively stable at room temperature if kept in the dark. We may have to reorientate our ideas on the preservation of the vaccine.

The other method of maintaining a suitable level of viability is by freeze-drying the vaccine. Much work has been done upon this subject, but most of it is vitiated by the lack of adequate methods of counting viable tubercle bacilli. However, enough information is available to say that B.C.G. can be freeze-dried with about the same initial loss in viable organism count (amounting to 90% of the initial count) as most viruses and bacteria, and the remaining living organisms maintain their viability almost indefinitely. Therefore, if material with a sufficiently high initial titre is used, freeze-drying is a satisfactory method of distributing vaccine to distant and inaccessible places. It is certainly sufficiently effective to be used as a method of maintaining seed cultures, so that the genetic characters of the strain do not change.

Summarizing this section, we may say that current methods of maintaining and preparing the vaccine, while resulting in the production of a vaccine which will confer effective immunization, are unduly cumbersome and the vaccine so prepared has a very limited period of usefulness. Experimentally, a highly potent vaccine with long life can be simply prepared in Dubos liquid Tween-albumin medium, but no clinical trials have yet been reported with this product, although I believe some are now being conducted in Europe.

In the remaining few minutes it may be useful if I raise a few questions of bacteriological interest in the process of vaccination. Firstly, I may mention the mode of vaccination and its effects. While oral vaccination was used in the earlier days, and subcutaneous inoculation had a brief vogue, all current techniques aim at the introduction of the bacteria into the dermis, by intradermal inoculation, by scarification or with a multiple puncture instrument. If effective this initiates a generalized infection, for the bacteria soon pass to the regional lymph nodes and in all probability are eventually spread through the bloodstream to all parts of the body. But, unlike infection with virulent bacilli, this generalized stage is of short duration and negligible severity, and soon the only place in which viable B.C.G. can be found is in the regional lymph nodes. It appears likely that the organisms die out completely within six to twelve months of vaccination, although tuberculin allergy and enhanced resistance to tuberculosis usually persist for a much longer time.

The next question we may touch upon is the influence of the age of the host upon the response to vaccination, and this is of practical importance because of the desirability of vaccinating infants borne of tuberculous mothers. Investigators in Norway and Sweden have shown that vaccination of the newborn is a successful operation, but they found that tuberculin allergy, the usual index of a successful vaccination, may not develop for nearly three months. Two English workers (Gaisford and Griffiths, 1951) have shown recently that newborn children can be satisfactorily vaccinated with the same dose of vaccine as older children. If it is necessary for administrative reasons (duration of segregation *et cetera*) to immunize the subjects rapidly, this may be done by using larger doses of vaccine. With the standard dose complications are few, but they increase when larger doses are used. Gaisford and Griffiths suggest that when rapid conversion is desired the likelihood of complications (local abscess or lymphadenitis) may be diminished by giving the injection in divided doses at different sites.

We really know nothing about the proper dosage of B.C.G. Obviously we should use a dose which will produce the maximum response, and the maximum durability of enhanced resistance, but which is not enough to cause too severe local lesions. In guinea-pigs, we found that doses of less than 100 viable microorganisms would produce tuberculin sensitization, although this was slighter in degree than was obtained with larger doses. There appeared to be no further increase in sensitization with increases of the dose from 5000 to 500,000 viable units. No studies have been reported of the infective dose of B.C.G. in man, and all trials with "0·05 milligramme", "0·10 milligramme" *et cetera*, are practically meaningless, for we know that on one occasion 0·05 milligramme may contain 1,000,000 viable organisms and on another occasion 10,000. It is clear from investigations carried out by the Tuberculosis Research Office of the World Health Organization (Palmer, 1952) that such variations in dose and depth of inoculation as might be expected when different vaccinators used the same vaccine have no demonstrable effect upon the reaction. Dilution of the vaccine one in ten had no significant effect on the tuberculin responses, and with most batches of vaccine good results were obtained even with a one in 100 dilution. Dr. Edgar North obtained similar results in the vaccination of medical students in Melbourne with freeze-dried vaccines.

We may pause here to consider briefly some of the more recent published results of the efficacy of B.C.G. vaccination. Three merit brief description here. The first concerns the five-year follow-up of the epidemic of tuberculosis in the girls of a State school in Denmark, described by Hyge. Table I shows the data five years after the exposure of the students, one-third of whom had been vaccinated with B.C.G. about a year earlier, to a severe risk of infection for a limited period of time in December, 1942. It is apparent that vaccination secured for the vaccinated girls the same degree of immunity as did prior natural infection, with the advantage that there was no risk of either endogenous reinfection, or primary tuberculosis of such severity as to eliminate an unknown number of individuals from the group before their admission to the school.

Another report concerns the results obtained with 36,000 B.C.G.-vaccinated and 25,000 non-vaccinated tuberculin-negative Swedish conscript soldiers, during the years 1941 to 1944 (Dahlstrom and Difs, 1951). This was a retrospective study, and the difficulty inherent in such studies—namely, the comparability of the vaccinated groups and unvaccinated groups—engenders a certain degree of reserve before the results are accepted at their face value (Editorial, 1952). In Table II the ratios for various manifestation of tuberculosis in the two groups are set out, all cases in the vaccinated group being taken in one instance, and only those occurring after protection would be expected to have been established (four to six months after vaccination, in the opinion of these workers) in the

other. In addition to this definite reduction in mortality and morbidity from tuberculosis, B.C.G. vaccination seemed to prevent epidemics of tuberculosis in military service as from the time when B.C.G. protection could be expected.

At the risk of great over-simplification, it may be pertinent to condense the experience of Hertzberg in Oslo. Hertzberg considered that it was possible to detect "superinfection" of a B.C.G.-vaccinated individual with virulent tubercle bacilli by quantitative tuberculin tests, and this forms the main novel feature of his study. We shall concern ourselves only with the rather small group of individuals successfully vaccinated with B.C.G. in whom subsequent tuberculin tests demonstrated that superinfection with virulent bacilli had occurred. The control series consisted of individuals on the registers of the Tuberculosis Department who had been tuberculin-negative when first tested and in whom the response to the tuberculin test had subsequently become positive.

Lastly, the experience with nurses at the Royal Melbourne Hospital is worth comment. I am indebted to Dr. J. H. Lindell for information upon this. There are 120 to 130 new trainees each year, of whom about 80% are Mantoux-negative. B.C.G. vaccination was introduced in 1947, and no other special measures (such as universal X-ray examination of all patients admitted to hospital) were undertaken at that time. In the two years prior to B.C.G. vaccination there were eleven cases of tuberculosis in the nurses, and this appears to have been about the figure for several years. In the five years since the introduction of B.C.G. there have been four cases of tuberculosis. Two of these occurred in nurses who were Mantoux-positive on admission and were not vaccinated. One suspected primary infection occurred in a Mantoux-negative girl who for some reason missed vaccination. The only suspected case of tuberculosis in a vaccinated individual was that of a nurse who was found to have lung opacities during a routine X-ray examination five years after being vaccinated. These opacities have since disappeared and the girl is well.

TABLE I.

Occurrence of Primary Tuberculosis and Progressive Pulmonary Tuberculosis in Students Subjected to a Severe Risk of Infection for a Limited Period of Time (from Hyge, 1947, 1949).

Group.	Number of Subjects.	Number Becoming Tuberculin-Positive.	Signs of Primary Tuberculosis.	Progressive Pulmonary Tuberculosis.
Tuberculin-negative B.C.G.-vaccinated ..	94 106	70 —	41 0	11 2
Tuberculin - positive from prior infection	105	—	—	4[1]

[1] Hyge regards two of these four cases as the result of endogenous reinfection.

TABLE II.

Morbidity and Mortality from Tuberculosis in Swedish Army Conscripts (Dahlstrom and Dify, 1951).

Condition or Outcome.	Period.	B.C.G.-Vaccinated Group (36,235).	Control Group (25,239).
Primary tuberculosis ..	Whole period.	1	3·5
	Period after protection	1	7·1
Post-primary tuberculosis	Whole period ..	1	2·3
	Period after protection	1	3·7
Deaths from tuberculosis	Whole period ..	1	3·0
	Period after protection	1	5·4

An important point in connexion with the Scandinavian work which I have just described is the frequency with which, in those countries, primary infection is followed by progressive pulmonary tuberculosis. In England, the United States of America and Australia destructive pulmonary tuberculosis often appears to be a late episode, following either late primary infection, or more often exogenous or endogenous reinfection of adults aged over forty years, with a previously "healed" infection. If the immunity which follows natural infection with virulent bacilli may be thus overcome, what, ask some English and American critics of B.C.G., can be expected from the "weaker immunity" which follows B.C.G. vaccination? This legitimate criticism cannot be answered yet. Carefully controlled studies of vaccinated individuals have not been in progress for long enough periods in suitable population groups.

Finally, the problem arises of vaccination and revaccination. When Calmette first proposed mass vaccination of newborn infants, the question of revaccination did not arise, for the incidence of childhood tuberculosis in the great European cities was so high that practically every vaccinated child would soon be infected with, and Calmette hoped would withstand, infection with virulent bacilli. This successfully resisted superinfection would, in Calmette's view, confer an enhanced and durable resistance to tuberculosis.

TABLE III.

The Progress in Type of Tuberculous Disease, and Mortality, in Vaccinated and Control Groups (condensed from Hertzberg, 1948).

Sex.	Group.	Number of Subjects.	Number with Tuberculosis.	Number Showing Progression.	Number of Deaths.
Male ..	Vaccinated.	756	10	3	0
	Control ..	861	308	92	14
Female	Vaccinated	773	12	0	0
	Control ..	968	365	72	28

That epidemiological situation no longer holds, at least in countries like Australia, and the durability of the resistance conferred by vaccination, and the necessity for and efficiency of revaccination, are amongst the most important unsolved problems facing the public health worker. They are problems in which laboratory investigation with animals cannot give much help, and they will have to be solved by careful long-term experiments in man.

Summary.

In summary, it is apparent that there is much that we do not know about B.C.G. vaccination, and we do not make the best use of the knowledge we have. We are profoundly ignorant of the mechanism of immunity in tuberculosis, upon which the use of B.C.G. vaccine depends; and although we do now know how to produce a vaccine of high potency and viability and how to maintain seed culture so as to ensure genetic stability of the strain, we still adhere religiously to a ritual of vaccine production and maintenance of the strain laid down thirty years ago by Calmette. Nevertheless, I think that there is no doubt now that B.C.G. is both safe and in many epidemiological situations effective in materially reducing the mortality and morbidity due to tuberculosis. Here in Australia, remote from the emotional controversies that still surround B.C.G. in Europe and America, we are just embarking upon B.C.G. vaccination programmes, and if we take our opportunities we may be able to surmount some of the practical difficulties which I have described, even if we do not solve the problem of the mechanisms of acquired immunity in tuberculosis.

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A PRACTICAL METHOD FOR DETERMINING THE SENSITIVITY OF MICROORGANISMS RESPONSIBLE FOR VARIOUS INFECTIONS.

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WHEN aureomycin and "Chloromycetin" became available during 1950 the medical practitioner had five antibiotics in his armamentarium. Until that time the general rule for the use of antibiotics was: try the sulphonamides; if they fail, try penicillin either alone or in addition to the sulphonamides. Streptomycin as a primary treatment was reserved exclusively for tuberculosis, but was tried in certain other infections which failed to respond to either sulphonamides or penicillin. When laboratory facilities were available the disease-producing organism was cultured and its morphology usually accepted as an indication of sulphonamide or penicillin sensitivity. Culture of the organism on solid media to part of the surface of which penicillin or a sulphonamide had been added was the most delicate scientific method in general use for deciding antibiotic sensitivity or resistance. Neither of these methods of determination was highly dependable. In recent years it has become increasingly apparent that morphology is not a sound basis on which to decide sensitivity, and the sensitivity test as performed on solid media does not always apply *in vivo*.

The advent of aureomycin and "Chloromycetin" produced further complications. If one excluded those diseases in which these new antibiotics alone had been shown to have a favourable effect (virus pneumonia, typhoid fever *et cetera*), how was the most effective of the five antibiotics to be determined in each case except by clinical trial and error, or by a not very dependable sensitivity test? If more antibiotics became available, how would the one of choice be determined if or when there were, say, twenty-five?

In an attempt to solve this problem we thought that the determination of the sensitivity of an organism should involve the culture of the organism in a solution of the antibiotic, the concentration of which should approximate that in the blood when a standard course of the antibiotic is administered. Should growth fail to occur *in vitro*, then administration of the standard course of the antibiotic to the patient might be expected to inhibit growth *in vivo*. This basis having been suggested and blood concentration figures provided, a satisfactory and relatively simple sensitivity test was developed by one of us (R.F.). At first it was applied to urinary infection, but it has since been used for many other infections with equally successful results—namely, infected wounds, discharging ears, respiratory tract infection, urethritis, in fact, any infection from which the responsible organism can be obtained. The test indicates the antibiotics which will be effective against a particular organism. When more than one antibiotic will be effective, the cheapest and most readily available can be chosen for use. Except in the occasional case in which subculture is necessary (see later), results are available in twelve to fifteen hours. Time and money are saved. There are no trial and error tactics. There have been no failures; results *in vitro* have invariably applied *in vivo*. During the past three years the test has been applied to over 250 specimens of infected urine alone. Some of the infections had been present for more than a year.

In addition to testing the sensitivity of an organism against each antibiotic separately, mixtures of certain antibiotics are used, as these have been found effective when singly they were ineffective. The most favoured of such combinations are streptomycin *plus* aureomycin, and aureomycin *plus* "Chloromycetin". In one case a Friedländer's infection causing a lung abscess growth was inhibited only

TABDE I.

Effectiveness of Antibiotics and Sulphonamides in Urinary Infection (122 Cases).

Organisms.	Number of Cases.	Effectiveness of Antibiotic or Sulphonamide.[1]				
		Sulphonamide.	Penicillin.	Streptomycin.	"Chloromycetin."	Aureomycin.
Staphylococcus aureus	10	−	−	+	+	−
	5	−	+	−	+	+
	2	+	+	−	−	+
	2	+	−	+	+	−
Streptococcus faecalis	10	+	+	−	+	+
	4	−	+	−	+	−
	2	+	−	+	−	−
	2	+	+	+	+	+
Escherichia coli	20	+	+	−	−	−
	6	−	+	+	−	−
	1	+	+	+	+	+
	2	+	+	+	−	+
Proteus vulgaris	8	+	+	+	+	+
	1	+	+	+	+	+
	2	+	+	−	−	−
	1	−	+	+	−	+
Mixed infections	5	+	+	−		
	10	+	+	−	−	+
	1	+	+	+	+	+
	4	+	+	+	−	−
	2	+	+	+	−	+
Unidentified	4	−	−	+	−	−
	3	−	+	+	−	+
	4	+	+	−	−	−
	4	+	+	+	+	−
	7	+	+	+	−	−

[1] "+" = growth present (resistant); "−" = growth absent (sensitive).

by a mixture of streptomycin, aureomycin and "Chloromycetin". It is interesting to note that the test has repeatedly demonstrated that sulphonamides inhibit penicillin, that is, an organism resistant to sulphonamides and sensitive to penicillin grows in a mixture of sulphonamide and penicillin.

Details of the Test.

The details of this test are as follows:

Materials.

The following materials are necessary to carry out the test: double strength nutrient broth tubed in two-millilitre quantities (pH 7·6); sterile solutions of "Chloromycetin" (16 microgrammes *per centum*), of aureomycin (16 microgrammes *per centum*), of streptomycin (12 microgrammes *per centum*), of sulphacetamide (20 milligrammes *per centum*), of penicillin (10 units per five millilitres), of aureomycin (16 microgrammes *per centum*) *plus* streptomycin (12 microgrammes *per centum*), and of aureomycin (16 microgrammes *per centum*) *plus* "Chloromycetin" (16 microgrammes *per centum*); sterile distilled water. (With the exception of the penicillin the solutions listed are stable at 5° C. for approximately one month.)

The following apparatus is required: sterile two-millilitre pipettes; test-tube racks; a photoelectric colorimeter or a suitable instrument for measuring the increase in turbidity caused by bacterial growth.

Method.

A test tube rack is set up with eight test tubes each containing two millilitres of the sterile double strength broth. With a pipette the following solutions are introduced in the test tubes: into tube 1, two millilitres of "Chloromycetin" solution; into tube 2, two millilitres of aureomycin solution; into tube 3, two millilitres of streptomycin solution; into tube 4, two millilitres of sulphacetamide solution; into tube 5, two millilitres of penicillin solution; into tube 6, two millilitres of streptomycin *plus* "Chloromycetin" solution; into tube 7, two millilitres of "Chloromycetin" *plus* aureomycin solution.

The concentration in the tubes is now approximately the same as the blood level of a patient receiving a standard dose of the chemotherapeutic agents concerned.

Each tube is inoculated and shaken, and a reading is taken with a photoelectric colorimeter. The reading is recorded for later use. The tubes are incubated for twelve to fifteen hours. After the incubation period the tubes are shaken and again a reading is made with the colorimeter.

In the tubes in which bacterial growth has occurred the resulting increased turbidity will be indicated by a variation in the second colorimeter reading as compared with the first. The increase in turbidity may not be detected by the naked eye, especially when the inoculum renders the solution turbid before incubation. The tube or tubes which give identical colorimeter readings before and after incubation are those in which no bacterial growth has

TABLE II.

Combination of Antibiotics Necessary in Urinary Infection.
(13 Cases out of Total of 135.)

Effective Combination.	Number of Cases.	Organism.
Aureomycin *plus* streptomycin	10	*Proteus vulgaris* .. 8 *Streptococcus fæcalis* .. 2
Aureomycin *plus* "Chloromycetin"	3	*Escherichia coli* .. 1 *Proteus vulgaris* .. 1 *Escherichia coli plus Proteus vulgaris* .. 1

TABLE III.

Patient's Initials.	Type of Swab or Specimen.	Organisms.	Effectiveness against Sulphonamide or Antibiotic.							
			Sulphamerazine.	Sulphacetamide.	Penicillin.	Aureomycin.	"Chloromycetin."	Streptomycin.	Aureomycin + "Chloromycetin."	Aureomycin + Streptomycin.
R.K.	Pus from hydatid cyst.	*Staphylococcus aureus.*	0	+	+	0	0	–	0	0
M.S.	Dressings from burns prior to graft.	β Streptococci.	0	+	+	+	–	+	–	–
S.B.	Swab of prostatic exudate after prostatic massage.	*Streptococcus fæcalis.*	0	+	+	0	0	–	0	0
M.F.	Sputum from lung abscess before operation.	Friedländer's bacillus, *S. albus*, *S. aureus.*	0	+	+	+	+	+	+	+
J.	Sputum.	Mixed growth including *S. aureus*, and pneumococci.	0	+	+	–	+	+	0	–
R.	Swab from gunshot wound of arm.	*Escherichia coli*, *Proteus vulgaris.*	0	+	+	+	–	+	0	–
W.	Swab from leg stump (after operation).	3 Streptococci.	0	+	+	–	+	–	0	–
P.W.J.	Swab from tuberculous sinus.	β Streptococci.	0	+	+	+	+	+	0	–
A.	Gunshot wound.	*Escherichia coli.*	0	+	+	+	–	+	0	–
J.F.	Urine.	*S. albus* + *S. fæcalis.*	0	+	+	0	0	–	0	0
L.	Urine.	*S. fæcalis.*	0	–	+	–	–	+	0	+
P.T.	Lung abscess (before operation).	*P. vulgaris.*	0	+	+	+	+	+	–	–
R.A.N.C.	Ear swab.	*Pyocyaneus.*	0	+	+	+	–	+	0	–
T.	Ear swab.	*Pyocyaneus* + *S. aureus.*	0	+	+	+	–	+	–	–
P.P.	Urine.	*E. coli*, *S. fæcalis.*	0	+	+	0	0	–	0	0
S.R.	Urine.	*P. vulgaris.*	0	+	+	+	0	–	0	–
T.C.	Sigmoidoscopy specimen of fæces.	*E. coli* + *S. fæcalis* + *S. aureus* + *S. albus.*	0	+	+	+	–	–	0	+
R.	Swab of knee after operation.	*S. aureus.*	0	+	–	–	–	–	0	–
E.	Throat swab.	*S. aureus.*	0	+	–	–	–	0	0	–
R.	Subculture from blood culture.	Short chain non-haemolytic streptococci.	0	+	+	0	0	–	0	0
O.	Swab.	Mixed growth including 3 streptococci.	0	+	+	+	–	–	0	–
H.	Mouth swab prior to dental extractions.	Mixed growth.	0	+	+	–	–	–	0	–
D.	Fæces.	3 Streptococci + *E. coli* + *S. aureus.*	+	+	+	+	–	+	0	0
B.	Sputum.	Mixed growth including *S. aureus* + Pneumococci.	+	+	+	+	–	+	0	–
S.	Ear swab.	*Pyocyaneus*, *S. aureus.*	0	+	+	+	–	+	0	+
P.	Swab of nasal discharge.	*S. aureus.*	0	+	–	–	–	–	0	–
C.H.	Swab of prostatic exudate after prostatic massage.	*S. fæcalis*, *S. aureus.*	0	+	–	–	–	+	0	–
D.N.R.	Fæces.	β Streptococci + *S. aureus* + *S. fæcalis.*	0	+	+	+	–	–	0	–
W.	Throat swabs.	β Streptococci + *S. aureus* + diphtheroids.				0	0	–	0	0
W.	Throat swab.	Diphtheroids, 3 streptococci.	+	+	–	0	0	–	0	0
C.	Throat swab.	β Streptococci.	+	+	+	0	0	–	0	0
S.E.A.	Sputum.	All bacteria tested together.		–	+	–	–	+	0	–

"0" = not tested against; "+" = growth present (resistant); "–" = growth absent (sensitive).

occurred. The antibiotic contained in that tube or tubes will be effective in combating the particular infection.

Method of Obtaining Inoculum with Material from Various Sources.

Swabs of Infected Material.—Inoculum may be obtained from swabs of infected material in the following ways: (*a*) a broth culture may be made from the swab and, when there is sufficient growth, it is transferred as a subculture to the tubes in the test; (*b*) the swab can be squeezed out in sterile nutrient broth and shaken well, and a drop of the suspension used to inoculate the tubes. In practice the latter method has proved quite satisfactory and also saves considerable time.

Body Fluids Excluding Blood and Sputum.—Apart from blood and sputum, it is usually possible to use body fluids, such as urine, cerebro-spinal fluid and serous and cavity fluids, without treating them in any way, simply by inoculating each tube with a drop or two of the fluid.

Blood.—Unless blood is grossly infected it is usually necessary to prepare a blood culture in the ordinary way and, when there is sufficient growth, to use a drop or two from the culture to inoculate the tubes in the test.

Sputum.—With sputum it is possible in some cases to make a suspension by shaking some of the sputum with nutrient broth and using this as the inoculum; alternatively the sputum should be submitted to culture in the usual way and the organisms selected from the culture and tested for their sensitivity to various chemotherapeutic agents.

Fæces.—With fæces it has been found more satisfactory in most cases to prepare a culture from the fæces, select the organisms and test for sensitivity.

At the time of reporting on this method, further investigation is being carried out, as there is a possibility that a suitable method can be developed which will make direct reading of the test possible—use being made of an indicator to show where bacterial growth has occurred.

Further tests are also being carried out to check whether the antibiotics will remain stable in a broth solution. If the results are satisfactory, it will make it possible to "tube" a quantity of the broth *plus* antibiotic in advance. This will save time and make the test quite simple, requiring little technical skill to perform.

As a commercial proposition, should the test become popular, it may also be possible to get the correct amounts of dry antibiotic put up in tubes which would require only the addition of nutrient broth in a given amount. This, along with direct reading, would make the test possible where laboratory facilities are limited.

The standard doses of the drugs used are as follows: sulphonamides (sulphadiazine), three grammes for the initial dose, then one gramme four-hourly; penicillin, 100,000 units six-hourly by intramuscular injection; streptomycin, half a gramme daily; aureomycin, half a gramme every six hours; "Chloromycetin", half a gramme every six hours.

The test shows the effective antibiotic without determining the morphology.

For interest and completeness it has been the usual practice to prepare a culture of the organisms on blood agar concurrently with the performance of the test. This culture serves to identify the organism. The results of this work are set out in Tables I, II and III, which demonstrate that morphology is not a sound basis for deciding antibiotic sensitivity.

When two infecting organisms are present (for example, in urinary infection) the test indicates what will inhibit both organisms. However non-pathogenic one organism may appear (for example, *Staphylococcus albus*), failure to eradicate it and treatment of the obvious pathogen only has been observed to result in relapse.

Comment.

With the exception of tuberculosis and diseases due to anaerobic organisms, the test as described can be applied to any bacterial infection from which the offending organism can be isolated.

The concentration of each antibiotic and the dosage used have been found to be satisfactory in practice. The only antibiotic whose dose may be greatly increased without risk of toxic effects is penicillin. Certain infections (for example, suppurative pneumonitis) respond to penicillin in large doses (that is, 3,000,000 units daily) while they are unresponsive to the usual dosage. The possibility that penicillin in high dosage will be effective in a particular infection can be determined by including in the test an additional tube containing 50 units per five millilitres.

As new antibiotics become available they can be included in the test. Terramycin has recently been added, the same concentration being used as for "Chloromycetin" and aureomycin.

Much has been written in recent years about the choice of antibiotics for various infections. The site of the infection and the morphology of the organism are frequently quoted as reliable guides. Each package of certain of the antibiotics includes a pamphlet which lists organisms or diseases for which the particular antibiotic will be clinically beneficial. Further, some drug manufacturers have prepared an attractive chart representing a spectrum, in which organisms are arranged opposite the antibiotic to which they are said to be sensitive. Since the classification of bacteria is based on morphology, these lists and charts represent morphology as a dependable basis for deciding antibiotic sensitivity. Reference to Tables I and II will show that this is unsound. Table I comprises 122 cases of urinary infection which responded to single antibiotics, and Table II shows a further 13 cases for which a mixture of two antibiotics was necessary. The variable sensitivity of morphologically identical organisms is evident. Some of the infections had been treated unsuccessfully for more than a year. Administration of the antibiotic or antibiotics indicated by the test eradicated the infection in every case.

Table III lists organisms from various sources. It includes only a few to which the test has been applied during the past three years. It indicates that site of infection is no indication of morphology or sensitivity. Examination of the three tables leads one to conclude that there are several strains of morphologically identical bacteria whose antibiotic sensitivity can be determined only by a test such as that described.

In certain cases the withholding of all antibiotic therapy until this test had been performed would be unjustified, but the plea is made that this test should replace the clinical trial-and-error tactics which have become too familiar. As a general rule it is suggested that either sulphonamides or penicillin be chosen for use. If clinical response is unsatisfactory, then the use of this test to determine the most suitable antibiotic is indicated.

Apart from tuberculosis and anaerobic and virus infections, such a *régime* would restrict the use of the expensive antibiotics and those in short supply to cases in which these antibiotics alone had been shown to cause benefit. Moreover, it would give some semblance of a scientific approach to the choice of antibiotics.

Summary.

A relatively simple in-vitro test for determining the sensitivity of bacteria to antibiotics is described. The test has been in use at the Repatriation General Hospital, Hobart, for approximately three years and has proved consistently dependable.

Acknowledgement.

We thank the Chairman of the Repatriation Commission for permission to publish this article.

Addendum.

Since the test was developed three years ago there has been some variation in the concentration which may be attained with certain antibiotics, but this does not influence the fact that the concentrations and dosages used by us have been found to be satisfactory. As the test has been applied to adult males, standardization of dosage has been possible. Naturally, the dosages must be adjusted for gross variations in body weight.

THE MANAGEMENT OF LATE ACUTE APPENDICITIS.

By L. I. BURT,
Brisbane.

I HAVE selected in this article those points in the management of late acute appendicitis concerning which I find most controversy among resident medical officers and others. I have heard resident medical officers expressing the opinion that "now we have antibiotics all cases of appendicitis can be operated upon immediately with attempted appendicectomy". This has apparently been taught by some.

An attempt has been made to clarify reasons for methods of treatment after observation of over 1000 patients from before the antibiotic era.

Conclusions.

From this experience I have drawn the following conclusions:

1. That the conservative non-operative treatment of the patient with late acute appendicitis should not be abandoned in every case.

2. That the conservative treatment of acute appendicitis can be used less often than formerly.

3. That when patients have been allowed to recover from the acute attack without appendicectomy, the interval before operation can be reduced since chemotherapy and antibiotics have become available.

I now wish to explain these conclusions, which have been the result of observation, without becoming tedious over case histories.

Course of the Disease.

In the course of the disease the patient may develop (*a*) generalized peritonitis or (*b*) localized peritonitis with (i) a mass or (ii) an abscess.

Before the advent of antibiotics a patient with appendicitis whose history was fifty hours or more in length would have guarding or rigidity of the abdominal wall or even distension. In some cases generalized peritonitis would be apparent. In others there would be definite evidence of localization. This would be looked for most carefully, and when it was present operation would be postponed and the patient watched carefully for any evidence of extension.

Definite evidence of localization is afforded by a mass palpable through the abdominal wall or *per rectum* or *per vaginam*, and a soft abdomen elsewhere. Sometimes no mass is palpable because of guarding of the right abdominal wall, but the time factor and reduction in pain *plus* a soft and not very tender left half of the abdomen might decide in favour of a localizing process.

Often in cases of doubt a mass becomes palpable under anæsthesia.

In some of these cases the mass becomes an abscess requiring drainage, and in a greater proportion it undergoes resolution without drainage. These cases will be described by the terms appendix abscess and appendix mass respectively, to distinguish them for the purpose of this article.

In most cases in which resolution occurs the appendix wall has retained its integrity. There is something—omentum or small gut or caecum or parietal wall—in contact with all parts of the appendix. The inflammation extends to involve these structures. This is the "mass".

The infection subsides, perhaps aided by liquefaction of a fæcolith and extrusion of contents of the appendix into the caecum.

I believe that most of these masses go on to spontaneous resolution without forming an abscess.

Then the appendix wall may not retain its integrity and an abscess containing liquid pus occurs. There is little doubt that very few of these will subside without drainage. These may be referred to as appendix abscesses.

If the appendix mass is operated upon, it is possible to separate gently the lightly adherent and œdematous and inflamed tissues and fibrin and to remove the appendix. This was possible and often done before antibiotics were available. It is now safer than before. If on separation of the tissues an abscess should be encountered, this can be sucked out and a tube placed in the breach in the localizing wall. Here again antibiotics have shortened the illness and lessened complications.

At one time such an appendix mass or abscess would be carefully watched for indications for drainage and these indications would be laid down in a definite list. Once the indications for drainage were present, then the patient would be carefully examined for a position where the abscess was in contact with the abdominal wall, so that it might be drained without crossing the peritoneal "cavity", that is, through the abdominal wall or *per rectum* or *per vaginam*.

Disadvantages of Immediate Interference.

The disadvantages of immediate interference in these cases are as follows:

1. Separation of the localizing wall may result in a spread of infection and general peritonitis.

2. Control of bleeding in necrotic tissues is difficult. Ligation of the mesoappendix may be followed by cutting-through of the ligature.

3. Blood is an excellent culture medium.

4. Crossing the peritoneal "cavity" to evacuate and drain a localized abscess can result in further contamination of the greater sac.

5. Where there is but a small abscess which is drained with a tube and the tube lies against inflamed visceral walls, the risk of fæcal fistula is increased.

6. Our risks are all bound up with infection and its control, and to combat this we have the antibiotics. There are, however, antibiotic-resistant organisms and organisms against which the antibiotics used may be but partially effective.

Advantages of Immediate Interference.

When successfully performed, the procedure of operating in all cases as soon as the patients are examined *plus* the administration of antibiotics will shorten the length of the illness by a large extent and often avoid a return to hospital for interval appendicectomy. I agree that with care this will mostly be the gratifying result. However, in spite of the advantages stated and because of the word "mostly" I would recommend (*a*) that patients in whom the evidence for localization is not clear should be operated upon as soon as can be arranged, and (*b*) that when there is clear evidence of localization in the form of a mass and absence of generalized peritonitis, the patient is better not operated upon; in this case, in spite of available antibiotics, careful watching is required.

A Disadvantage of Antibiotics in Conservative Treatment.

An appendix mass or abscess may be treated with antibiotics and the result will be unsatisfactory in that recovery is incomplete. There may be a few physical signs, such as a barely palpable mass *plus* continued low pyrexia. The antibiotics have controlled the infection but have not caused its complete disappearance. There may still be pus present in a localized collection, but it is not obvious how it is to be got at. Withdrawal of the antibiotics may result in enlargement of the abscess, when it may become accessible for drainage.

Interval Appendicectomy.

Since the infection is now more easily and rapidly controlled, adhesions are less and the condition more rapidly approaches normal. At one time it was customary to wait for ten weeks after recovery from the acute attack before proceeding to interval appendicectomy. A certain proportion of patients were back with a flare-up before this time. I have been shortening this interval rapidly and so far

have found no case which gave worry due to residual infection or adhesions. The shortest interval has been three weeks from the patient's discharge from hospital and five weeks from the onset of the condition.

Recently I have had admitted under my care in the Mater Misericordiæ Public Hospital six patients suffering from appendicitis within a few days of each other. Rll of these had an appendix mass more or less easily palpable, and a history of over fifty hours' duration. In five cases resolution occurred without operation, and in one drainage was necessary of an abscess which persisted. Five patients had appendicectomy performed three weeks after their discharge from hospital. All that was found at the operation was a few strands of organizing fibrin and an appendix in which there was evidence of recent infection. The patient who required drainage of an abscess had some discharge from the wound for a period of four weeks and did not undergo appendicectomy for a further two weeks. This patient had an appendix in an adherent mass of parietal wall and colon, but no abscess or necrosis remained. The site of perforation was obvious.

It is suggested, then, that if a mass has subsided readily without drainage the patient should wait three weeks after leaving hospital for the date of appendicectomy. I would suggest that, when drainage has been performed, three weeks after all discharge has ceased would be the minimum time to elapse before operation.

Indications for Drainage of Appendix Abscess.

I have included this short paragraph on indications for drainage of an appendix abscess for completeness and because it may be a useful guide. It is a matter for experience and judgement. The localizing appendix will cause less pain and less guarding of the abdominal musculature from the second day onward, and any deviation from this is a danger signal. Indications for drainage are as follows: (i) evidence of spread of peritonitis in the first few hours or days; (ii) persistence of size of the mass or increase in size of the mass after the fifth day of treatment; (iii) persistence of swinging temperature after the fifth day of treatment; (iv) evidence of acute small-gut obstruction, which will often disappear when an appendix abscess is drained.

Summary.

1. Conclusions are stated in regard to some aspects in the management of late acute appendicitis.

2. The course of the disease and some aspects of treatment with antibiotics are discussed.

3. The time factor in interval appendicectomy is discussed.

4. A short note of recent clinical experiences is added.

5. An outline of indications for drainage of an appendix abscess is given.

A NOTE ON FIBROCYSTIC DISEASE OF THE PANCREAS.

By G. E. M. SCOTT,
Melbourne.

BOYD (1935) describes four varieties of pancreatic cysts. Retention cysts of uncertain origin are small and often associated with chronic pancreatitis. The rare congenital cystic disease is associated with similar changes in the kidney and liver. Cystadenomata are also rare. Pseudocysts are commoner, but are not true cysts, for they lack an epithelial lining. They are associated with injury to the pancreas, or with acute hæmorrhagic pancreatitis. Muir (1936) refers to small cysts, the result of obstruction to pancreatic ducts, and cysts of congenital origin, called cystic degeneration. A cystic form of adenoma sometimes occurs, and a cerebral tumour of vascular origin may be associated with cysts of the pancreas or kidney. Boyd (1935) refers to obstruction of pancreatic ducts also, and this may lead to irregular dilatation, with resulting atrophy of acini, and their replacement by fibrous tissue. Muir (1936) regards duct obstruction as being responsible for some irregular dilatation of acini, and some small ducts may show cyst-like distension; the results vary with the constant or intermittent nature of the obstruction. The secretory cells of the pancreas atrophy and there results an overgrowth of connective tissue. Adipose tissue may accumulate. Davie (1938) reported the case of a female child, aged four years and four months, in whom the head of the pancreas had been largely replaced by adipose tissue, in which there remained a few small collections of gland acini, together with a slight increase in the amount of fibrous tissue. Wirsung's duct was occluded, but the duct of Santorini was not obstructed, although there was some uncertainty regarding patency of its duodenal termination.

The term "fibrocystic disease" was coined by Andersen (1936), when she was describing a case of cœliac disease, in which microscopic examination of the pancreas revealed spaces of irregular shape in the parenchyma, which resembled cysts. Andersen, in reviewing the literature, concluded from the related pathological reports that her case was representative of the same disease process. Andersen was unable to exclude the presence of duct atresia as an ætiological factor in pathogenesis. On the basis of cases reported by Harper (1930) the disease entity was regarded as being congenital in origin. Included in the "cysts" so described were ducts of the pancreas, lined by epithelium which had undergone metaplasia to a stratified type. Blackfan and Wolbach (1933), and Blackfan and May (1938), and later Farber (1942, 1944*a*, 1944*b*) developed the theory that the secretions of the gland were viscid, thus blocking the acini and ducts, and so forming the cystic areas revealed microscopically by a process of acinar atrophy due to pressure. No explanation of the associated fibrosis was given, or of the disappearance of lobular structure. Furthermore, enzyme deficiencies were attributed by these workers to the pathological state of the pancreas. The condition known as meconium ileus was further regarded as originating in such secretory abnormalities. Deficiency or malabsorption of vitamin *A* was considered as responsible for metaplasia of duct epithelium.

The problem of pancreatitis, other than acute pancreatitis, was studied by Edmondson, Bulloch and Mehl (1949) in cases associated with excessive use of alcohol and in diabetic subjects. Diffuse pancreatic fibrosis, obliteration of lobular architecture and dilatation of ducts together with hyperplasia were revealed. Destruction or functional failure of acini was accompanied by the presence of pink-staining eosinophilic material as described by Blackfan, Wolbach and Farber. However, the acini were not affected by severe and irregular dilatation, as seen typically in "cystic fibrosis" of the pancreas, nor was the acinar atrophy so uniform, but a more patchy distribution was present. Fibrosis was more in evidence in localized areas, where it tended to be accompanied by islands of surviving acini in collections or groups. However, the changes revealed the same basic pathological entities as seen in fibrocystic disease of the pancreas—namely, acinar atrophy, dilated ducts, eosinophilic material within ducts, and fibrosis. The distribution and pattern of the changes only were different. The apparent difference resided only in the absence of metaplasia of the duct epithelium, which was doubtless due to normal or substantially normal vitamin *A* metabolism. There was no suggestion that atresia of the duct system of the pancreas was responsible for the pathological picture revealed.

Scott (1950) showed in material obtained from a subject of cystic fibrosis of the pancreas that the changes incident in the pathological pattern could accompany and be observed side by side with parenchymal tissue of normal microscopic appearance. It is evident, then, that duct atresia or agenesis may be responsible for the pathological picture of the disease, but not for the changes related to

secretory activity and consequent acinar atrophy, directly connected as cause and effect in the manner postulated by Wolbach and Farber. For these workers, their hypothesis requires that the gland will be subject to the morbid process as a whole, although the incidence of the changes resulting may be graded into severe or less widespread areas in one instance or in another, or may be less pronounced in one instance than in another, or indeed may not be found present save on very careful search. The instances of the morbid state in this latter category offered the critical difficulty in accepting the thesis, for pathological changes were not commensurate with abnormalities as observed in patients during life as being uniform in all instances.

Reports of cases of intestinal obstruction in early infancy, of which meconium ileus is a particular example, are not numerous. When such reports have been made by pædiatric surgeons, interest has centred in abnormalities of the bowel and the pancreas has not been examined *post mortem*. When the patients have been primarily in the care of physicians, either the possibility of duct stenosis has not been considered at post-mortem examination or its presence has not been excluded with certainty. Hinden (1950) has reported an instance of true meconium ileus in which the pancreas was normal, and has reviewed the literature on the subject.

Scott (1950) stressed the importance of toxic and infective factors in the genesis of fibrocystic disease of the pancreas, and directed attention to the incidence of malnutrition as an important contributory cause of the morbid state. The areas described as "cysts" were revealed, in pathological material obtained, as being formed by coalescence of atrophic acini, in groups surrounded by fibrous tissue. It was further shown that the progressive development of the disease over a period of some three or four years, as postulated by Andersen, did not necessarily apply to all cases of the disease and, further, that the hypothesis of a congenital origin was not tenable. The work of Véghelyi (1950) on malnutrition in children has demonstrated that changes in the acini of the pancreas, indistinguishable from those observed in fibrocystic disease of that organ, occur in the absence of signs of the cœliac syndrome. Bostick and Rinehart (1950) noted the absence of apparent correlation between the degree of pancreatic involvement and the severity of the cœliac syndrome.

Baggenstoss (1948), in a study designed to investigate dilatation of pancreatic acini in fibrocystic disease of the pancreas, examined the gland in various disease states in adults. Stimulation by secretin of nervous stimuli from the vagus and sympathetic nerves, and dehydration and malnutrition (protein deficiency) were all considered as possible causative factors in relation to inspissation or "thickening" of pancreatic secretion and consequent acinar dilatation. No concrete conclusion resulted from this investigation.

Ball, Baggenstoss and Bargen (1950) studied a series of cases of chronic ulcerative colitis associated with pancreatic lesions; but they found no positive correlation between acinar dilatation and associated lesions, such as inflammation, fibrosis and fat necrosis. Acinar enlargement constituted expansion of individual pancreatic acini, with flattening of the acinar cells, and revealed approximately the same stage of development of the morbid process of dilatation in all lobules of the organ. Fibrosis was interlobular and periductal in distribution, and only when well advanced was it accompanied by considerable atrophy of the acini in relation to it. The incidence and distribution of fibrous tissue appeared to be determined by the location of inflammatory exudates. Loss of weight and emaciation were more apt to result in the subject when pancreatic lesions were found to have been present. When patients had, during life and survival from the disease, shown a good state of nutrition, lesions were found to be less pronounced. However, these workers were inclined to attribute this result to continuous treatment over long periods of time during the life of the sufferers from the disease.

Discussion.

The incidence of obstruction of pancreatic ducts, as well as congenital factors, appears to have played a significantly large part in theories explaining the genesis of cystic changes in the pancreas. It is, however, abundantly clear that other factors are at work in many cases.

Fibrocystic disease of the pancreas, the most recently named variant, is not of congenital origin, nor does it appear to be a disease *sui generis*. Its pathogenesis varies in no substantial degree from that of so-called chronic pancreatitis or interstitial pancreatitis. Nevertheless there are some special features of the type of pancreatitis which may accompany the cœliac syndrome.

The first of these characteristics was demonstrated in the present writer's case referred to earlier in this paper—namely, that instance in which pancreatitis was fully developed in one part of the gland while a group of adjacent lobules appeared normal on microscopic examination. This example suggests some other explanation of its mode of production than that presented by any theory relating to alteration in glandular secretions or the blocking of acini and ducts thereby produced, whether resulting from altered nervous stimuli or otherwise. It seems that the pathogenesis here can be explained satisfactorily only on the assumption of the presence of duct stenosis (a matter usually difficult to determine), or of agenesis relating to the affected part of the gland. Ordinary methods of examination failed to reveal pathological changes in one part of the section of gland examined. Moreover, it seems evident that had any other influences been present, such as are referred to, including toxic and infective factors and malnutrition, either the gland would have been uniformly affected or the part appearing normal would have presented some evidence of such influences. On the other hand, it seems to be established, from the case of meconium ileus reported by Hinden, that neither obstruction of the bowel nor a supposed alteration of secretory function of the pancreas at birth is alone a cause of fibrocystic disease. Nor does it derive from a congenital anomaly.

Fibrocystic disease of the pancreas is therefore no more a disease *sui generis* than is chronic pancreatitis, of which it appears to represent a variant. However, in the present state of knowledge such variations are of considerable importance, for they add to an understanding of the disease process as a whole.

Apart from duct metaplastic epithelial changes, the basic pathological pattern of fibrocystic disease of the pancreas resides in acinar variations and in fibrosis of the gland—the latter often causing complete disorganization of pattern, so that the tissue is hardly recognizable as pancreas. It has now been shown, by analogy from material obtained in adult subjects exhibiting pancreatitis, that increase in size of lumina of the acini may be quite uniform, and that enlargement of these structures can be related to the distribution of fibrous tissue resulting from the localized effects of inflammatory lesions. Furthermore, it has been demonstrated that atrophy of acinar cells may be irregularly distributed and patchy, and that normal acini may survive, and be surrounded by and enclosed in areas of fibrous tissue. Localized infective processes may interfere with cell nutrition, and factors affecting the organism as a whole, in the shape of malnutrition, may also be of considerable importance.

The distinctive features of the type of pancreatitis currently designated "fibrocystic disease" of the pancreas relate chiefly to the irregular size and shape of the acini, which are distinguishing characteristics. It seems reasonable to suppose, as the present writer has argued and demonstrated in pathological material, that the irregular size of the lumina of acini results from coalescence of these units, in pairs or groups, due to atrophic lesions in the cells of the acini, in combination with the laying down of fibrous tissue between and around them, in interlobular and intralobular distribution. These two types of distribution of fibrous tissue are well recognized in accounts of the pathology of pancreatitis. These lesions appear to result

from the effects of toxic and infective agents on the gland parenchyma, in association with malnutrition, in the case of fibrocystic disease of the pancreas. The pattern thus produced in the latter is unique and striking. The disorder and disruption resulting to the lobular structure of the gland render it hardly recognizable when the process is advanced. The like is seen only in advanced grades of chronic mastitis, from which the disordered section of pancreas is hardly distinguishable microscopically. Much remains to be learned of these lesions and their natural history, but it may be presumed the noxious influences at work are either initially severe at the onset or are repeated from time to time during the life cycle of the disorder. Further investigations may reveal that both phases occur. Such a theory well accounts for the observations that advanced lesions may be present quite early in life, and likewise minimal lesions do also occur in older subjects. The problem presented by the severity of morbid changes in relation to the age of the patient has been one of the major difficulties in elucidating the ætiology of this disease.

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FIBULAR OSTEOTOMY IN THE TREATMENT OF CONGENITAL CLUB-FOOT.

By FRANKLYN STONHAM,
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THE prognosis in cases of congenital *talipes equino-varus* depends very largely upon the early commencement of treatment and the thoroughness with which treatment is carried out. There is always some uncertainty in the outlook. While some feet respond readily to simple measures, others, especially those in which the heel is small and ill developed and the soft tissues are rigid, show a curiously stubborn resistance to treatment.

The plan of treatment commonly adopted is to commence in infancy by manipulation and to strap the feet in the over-corrected position. This may cure the condition; but if towards the end of the first year correction is not complete, or if the child is examined for the first time at this age, manipulation is carried out under anæsthesia. The feet are put up in plaster with as much correction as possible, and the procedure is repeated at intervals of about one month until some over-correction is obtained. A stage may be reached at which no further progress is being made, and persistence will cause the foot to yield at the calcaneo-cuboid joint while the calcaneus remains plantar-flexed. The cuboid forms an ugly projection, the overlying skin becomes calloused and the site becomes painful. Operative treatment is then indicated. Operations on the tarsal bones are unsatisfactory before the age of about fourteen years, and in any case, if undertaken earlier, they interfere with growth; but soft-tissue operations are useful in obtaining partial or even full correction from about the age

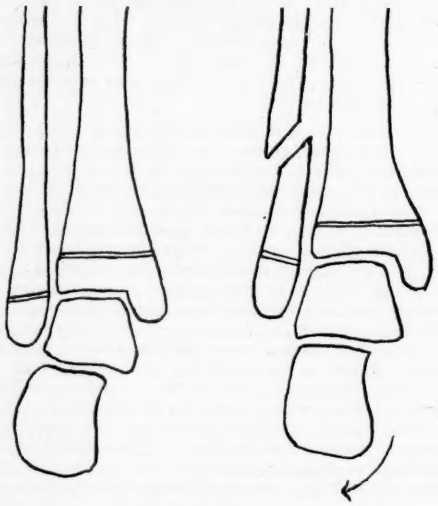

FIGURE I.

of nine months onwards. The common residual deformity requiring operative correction is equino-cavus. The cavus is corrected first by the Steindler type of operation of plantar fasciotomy, and subsequently the equinus is treated by lengthening the *tendo Achillis*.

With the child lying prone or on the side, a long incision is made on the lateral aspect of the tendon and parallel to it. The tendon is defined and a long "Z" is cut by transfixing the tendon in the coronal plane with a tenotome and cutting out backwards above and forwards below. The ankle joint is then flexed to ascertain how much dorsiflexion is obtainable, and it is commonly found that this is prevented by contraction of the posterior part of the capsule of the ankle joint and a thick mass of fibrous tissue attached to it. This is dissected away and posterior capsulotomy of the ankle joint is performed. This may allow some further forcible dorsiflexion at the ankle joint; but if it is impeded by shortness of other structures behind the joint, such as the *tibialis posterior*, they are divided. If the foot cannot then be forced into the desired position it is evident that the ankle joint is stenotic. The tibio-fibular mortice has only been occupied by the narrow posterior articular surface of the talus and has failed to grow in width and will not accept the broader anterior portion. Some widening of the joint may be effected by dividing the tibio-fibular syndesmosis; but this secures only a small amount of widening, as the tibia and fibula are still held approximated by the interosseous membrane above, which in children is short and strong. A more efficient widening can be obtained by exposing the shaft of

the fibula an inch or so above the ankle joint and cutting it with an osteotome obliquely from above downwards and outwards. The foot can then be wrenched outwards and then dorsiflexed into the corrected position. The *tendo Achillis* is then sutured with an appropriate amount of lengthening, the wound is closed, and the foot is put in plaster for six weeks.

The advantages of fibular osteotomy combined with lengthening of the *tendo Achillis* are twofold. This procedure may give an acceptable addition to the amount of dorsiflexion otherwise obtainable, and it allows the foot to be forced into a certain amount of valgus which assists in the correction of varus and cavus. The operation is therefore, while of limited scope, a very useful contribution to the sequence of treatment.

Reviews.

PERSONALITY AND THE FRONTAL LOBES.

IN "Personality and the Frontal Lobes", Mrs. Asenath Petrie[1] reports the results of psychological investigations carried out on seventy neurotics suffering from tension states with anxiety or obsessional symptoms, before and after leucotomy. The battery of tests used and described in some detail were those devised by H. J. Eysenck for the assessment of orectic qualities, and particularly designed to cover "neuroticism" and "extraversion-introversion". The Wechsler-Bellevue scale and Porteus mazes were employed for determining intelligence. The investigations aimed at a more precise and objective study of the functions of the frontal lobes than that obtained from ordinary clinical observation, and to this end a high degree of cooperation was required from the patients tested; psychotics were accordingly excluded. In general Mrs. Petrie found a reduction of self-criticism, of worry over the past and of regard for the future, and of concern about social standards. In the intellectual sphere verbal tests revealed a reduced capacity to generalize and learn from errors and some loss of precision in the use of language. The author suggests that emotional or temperamental factors may be responsible for some of the intellectual decline. Of the sixty odd patients who showed clinical improvement, the psychological tests indicated reduction in neuroticism and a shift towards extraversion. Reduction in social standards, which was slight anyhow, was less after the anterior rostral than after the posterior standard operation. The removal of tension was followed by improved efficiency and the resumption of a useful life. The book, which will appeal especially to clinical lay psychologists, illustrates the enormous amount of spade-work carried out by Eysenck and his school in the attempt to measure significant qualities in personality. For the present the experienced medical clinician will prefer to rely on his less objective impressions in the selection of cases, choice of operation and assessment of results.

CONDITIONED REFLEX THERAPY.

IT is difficult to know whether the book "Conditioned Reflex Therapy", by Andrew Salter, was written for the medical practitioner or the lay public.[2] The terms used, the tone of description and the dramatic recoveries cited would suggest that it is more for lay people. This attitude is supported by the opening sentence: "It is high time that psychoanalysis, like the elephant of fable, dragged itself off to some distant jungle graveyard and died. Psychoanalysis has outlived its usefulness."

An example of a clinical history is the following: "A man told me that unless I changed his personality from 'negative to positive', and thus made him interesting to his wife who had threatened to divorce him, he would put a bullet through his head. There was no mistaking his cool certainty. After some treatment, he called his wife, the woman he had admired, 'a parlor whore', and he considered suicide the most foolish idea he had ever had. Now, several years after his divorce, he is still getting along splendidly. It is excitation that makes the difference." The optimistic attitude towards the results of treatment is maintained even for the psychopathic personality. "The psychopath must try to practise excitation every time he opens his mouth."

The book is an attempt to show that the theory of conditioned reflexes can be readily used in the treatment of most psychiatric disorders. The opening chapters briefly describe experiments on conditioning, inhibition and excitation and how these mechanisms apply to treatment; yet the detail of this treatment is not sufficiently clearly explained to be of value. Then follow a number of chapters recording clinical histories under such headings as the following: "Problems of the Therapist", "Shyness and the Well-Bred Neurosis", "The Merry-Go-Round of Low Self Sufficiency", "The Addictions", "Anxiety", "Learning and Unlearning Homosexuality", and "The Psychopathic Personality.

Although the book serves in stressing the importance of the conditioned reflex, it fails to present this subject in a balanced fashion for any class of reader. There is little help for the general practitioner or the specialist in psychiatry.

HYGIENE, INFECTIOUS DISEASES AND DIETETICS.

"HYGIENE, INFECTIOUS DISEASES AND DIETETICS", by D. H. Geffen and Susan Tracy, is written as a text-book for student nurses in England.[1] A valuable fund of information on these important aspects of public health is presented briefly and clearly. The section on hygiene deals with the methods by which important factors of human environment are maintained at their optimum. The chapters on air, heating, lighting, water, milk, refuse and sewerage are largely of academic interest to the individual nurse, but those on personal hygiene, including that of the expectant mother, and the hygiene of ward and sick room, give specific advice and instructions of practical value. Infectious diseases, their recognition and management, are described with admirable economy of words. With the exception of gonorrhœa, the common acute infectious diseases of Great Britain are considered with general principles for their prevention and control. The subject of dietetics is reduced to the simplest of terms. The composition of food, the essential requirements of mankind, according to age, occupation or disease, and the care and preparation of food are indicated. This book is also most suitable for the instruction of the social worker, the educator and the thoughtful citizen.

THE NEWBORN.

THERE are many books on both pædiatrics in general and the newborn in particular. "Management of the Newborn", by A. H. Parmelee,[2] does not aim to compete with those more specialized productions, but, rather, to emphasize in a simple but reasonably adequate survey the importance of that short but important period which tends to get lost between standard works on obstetrics and pædiatrics. In this he succeeds very well and his work falls nicely within the scope of "The General Practice Manuals" series in which it is published. He follows an orderly sequence from the normal developmental anatomy and physiology of the fœtus through consideration of disorders due to hereditary and environmental disturbances up to the effects of post-natal infections and other hazards. Each section is dealt with clearly and concisely. Particular attention is paid to the premature child, for, as the author points out, although prematurity occurs in only 6% of all live births, it accounts for one-half of all the deaths occurring in the first post-natal month. The child at birth is already well advanced along a course of development which will continue for another twenty years or so. Birth itself, despite the profound adjustments involved, is only an incident in the whole process. Nevertheless, it is a highly critical period,

[1] "Personality and the Frontal Lobes: An Investigation of the Psychological Effects of Different Types of Leucotomy", by Asenath Petrie; 1952. London: Routledge and Kegan Paul, Limited. Sydney: Walter Standish and Sons. 9" × 6", pp. 200, with two illustrations. Price: 21s.

[2] "Conditioned Reflex Therapy: The Direct Approach to the Reconstruction of Personality", by Andrew Salter; 1952. London: George Allen and Unwin, Limited. 9" × 6", pp. 364. Price: 20s.

[1] "Hygiene, Infectious Diseases and Dietetics", by Dennis H. Geffen, M.D., D.P.H., and Susan Tracy, M.R.C.S., L.R.C.P., D.P.H.; 1952. London: Longmans, Green and Company. 7¾" × 5", pp. 284, with a few illustrations. Price: 16s.

[2] "Management of the Newborn", by Arthur Hawley Parmelee, M.D.; 1952. Chicago: The Year Book Publishers, Incorporated. 8¼" × 6", pp. 358, with 47 illustrations. Price: $7.00.

and every week gained contributes towards the individual's ability to cope with the rigours of of extrauterine existence. The author makes a strong plea for closer cooperation between obstetrician and pædiatrician during this critical period, and those familiar with the difficulties which attend these early days will support him. The book is clearly and simply written, the illustrations are adequate for the treatment adopted, and there is a good bibliography. The admittedly generalized nature of the work renders detailed criticism invidious. Both students and practitioners will derive pleasure and benefit from this book.

A MANUAL FOR CARDIOLOGICAL TECHNICIANS.

WITH the growth of cardiographic practice and the introduction of modern electrocardiographic machines to most hospitals in Australia, the need has arisen for a simple technicians' manual which will enable the technician and the physician to grasp the fundamentals of the subject and be something more than a mere operator of a machine. "Cardiographic Technique", by Barron and Schott, supplies this need.[1] The present volume discusses the genesis of the cardiogram, the normal values and the effect of the position of the heart on the electrocardiogram. Then follows a clear description of the string galvanometer and a section on valve amplifier machines, both photographic and direct writing. A simple chapter on the vectorcardiogram should make it intelligible to both technician and non-specialist physician. There is, in addition, a chapter on phonocardiography. Of value are the chapters dealing with the technical difficulties involved in taking electrocardiograms and the simple adjustments which can be made by those familiar with the principles of the apparatus in order to produce consistently good records. There can be no doubt that many of the principles which are so clearly defined here are often overlooked both in hospital and in private practice today, and one can most heartily recommend this book not only to technicians but also to those who find themselves responsible for the provision of a good electrocardiographic service in hospitals.

Notes on Books, Current Journals and New Appliances.

FAMILY DOCTOR.

THE October issue of *Family Doctor*, the British Medical Association's popular magazine, has the usual wide variety of sound and interesting articles and other features. In the section on family reading, Lord Webb-Johnson writes on triumphs of surgery, and there are articles on an English family and on noise. Grouped as "Mainly for Mothers" are articles on having a baby, toilet training, heartburn and the milk bank at Queen Charlotte's Hospital. "Medicine and Health" articles deal with change of life, penicillin, B.C.G., food poisoning, sleep, and first aid for a fractured thigh. The home and family section contains the usual regular features. The whole production is up to the customary high standard.

ALFRED HOSPITAL CLINICAL REPORTS.

THE second volume of "Alfred Hospital Clinical Reports" maintains the standard set by the first volume. It is well printed on art paper with a stiff cover and runs to 84 pages in length. Robert Fowler reports and discusses three cases of prosopopilary virilism, Ewen Downie writes on "Diabetes Mellitus—a Retrospect", and Leonard B. Cox describes the investigation of late sequelæ of head injury. Roderick Andrew and E. L. Angliss write on gastric secretion after abdominal section, C. J. Officer Brown on carcinoma of the œsophagus and the cardia of the stomach, C. H. Hembrow and E. L. Angliss (in separate articles) on sciatica, and John A. McLean on the use of unmodified blood in direct and exchange transfusions. Stanley Watson and Ross Anderson separately report cases of tetanus treated with "Myanesin", and K. N. Morris reports a case of intrathoracic goitre. Robert S. Lawson describes a splint for use after median nerve injury. The volume has been prepared by an editorial committee with J. Eric Clarke as editor.

[1] "Cardiographic Technique: A Manual for Cardiological Technicians", by S. L. Barron and A. Schott, M.D. (Heidelberg), M.R.C.S.; 1952. London: William Heinemann (Medical Books), Limited. 9″ × 6″, pp. 164, with 58 illustrations. Price: 21s

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Handbook of Tropical Dermatology and Medical Mycology", edited by R. D. G. Ph. Simons; Volume I; 1952. Amsterdam: Elsevier Publishing Company. 9″ × 6½″, pp. 862, with 587 illustrations. Price: £5 each volume.

The work of some eighty authors from many parts of the world.

"Diseases of the Ear, Nose and Throat", by J. Douglas McLaggan, C.V.O., M.A., M.B., Ch.B. (Aberdeen), F.R.C.S., and Josephine Collier, M.A., B.M., Ch.B. (Oxon.), F.R.C.S.; Second Edition; 1952. London: H. K. Lewis and Company, Limited. 9″ × 6″, pp. 446, with 149 illustrations. Price: 37s 6d.

Prepared with the needs of undergraduate medical students in mind.

"Basic Principles of Cancer Practice: A Book on Diagnosis, Prognosis, and Treatment of Human Neoplasms for the General Practitioner and Medical Student", by Anderson Nettleship, M.D., F.A.C.P.; 1952. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9″ × 6½″, pp. 408, with 106 illustrations. Price: 75s. 3d.

The author is professor of pathology in the University of Arkansas School of Medicine.

"Reaction to Injury: Pathology for Students of Disease: The Reactions of Submission and Adaptation and the Disease Entities Arising out of their Elaboration", by Wiley D. Forbus, M.D.; Volume II; 1952. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10″ × 7½″, pp. 1132, with 836 illustrations, 54 in colour. Price: £10 15s.

The title is self-explanatory.

"Cancer Cytology of the Uterus: Introducing a Concept of Cervical Cell Pathology", by J. Ernest Ayre, M.D.; 1951. New York: Grune and Stratton. London: J. and A. Churchill. 11″ × 8½″, pp. 420, with 362 illustrations, some in colour. Price: £5 5s.

This book has already been reviewed in the issue of August 2, 1952.

"Biochemistry and Human Metabolism", by Burnham S. Walker, M.D., Ph.D., William C. Boyd, Ph.D., and Isaac Asimov, Ph.D., with a foreword by John T. Edsall, M.D.; 1952. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 9″ × 6½″, pp. 820, with 21 text figures. Price: 96s. 9d.

Intended primarily for the medical student.

"The Scientific Study of Personality", by H. J. Eysenck, Ph.D.; 1952. London: Routledge and Kegan Paul, Limited. Sydney: Walter Standish and Sons. 8½″ × 6″, pp. 334, with 30 illustrations. Price: 30s.

Reports the results of experiments carried out at the Institute of Psychiatry (Maudsley and Bethlem Royal Hospitals) in the University of London.

"Basic Medical Physiology", by W. B. Youmans, Ph.H., M.D.; 1952. Chicago: The Year Book Publishers, Incorporated. 9″ × 6½″, pp. 452, with 116 text figures. Price: $7.50.

The author aims to present concisely the physiological principles forming the essential background on which to build more detailed knowledge of preclinical physiology or of clinical and pathological physiology.

"Progress in Neurology and Psychiatry: An Annual Review" edited by E. A. Spiegel, M.D.; Volume VII; 1952. New York: Grune and Stratton. 9″ × 6½″, pp. 618. Price: $10.00.

Subjects of new chapters include pædiatric neurology and genetics.

The Medical Journal of Australia

SATURDAY, NOVEMBER 29, 1952.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

ACCELERATED CONDUCTION IN THE HEART.

SOME months ago in a leading article[1] we described how a combination of modern high-speed cinematography and unipolar cardiography had been used to change our conception of auricular movement, and had led us to abandon the hypothesis of "circus movement" in these chambers of the heart. Similar techniques have now been applied to the curious accelerated conduction from auricle to ventricle which has been known as the "Wolff-Parkinson-White syndrome" or the "bundle of Kent syndrome". The same laboratory in the Cedars of Lebanon Hospital, Los Angeles, has recently published a small monograph describing this work by M. Prinzmetal, R. Kennamer, E. Corday, J. A. Osborne, J. Fields and L. A. Smith.[2] This group appear intent upon the investigation anew of traditional physiological concepts, and as a result of their special equipment have succeeded so far in showing the weaknesses and lack of dependability of a number of long-held articles of cardiological faith. In the present report, experiments are described which have been designed to investigate the hypothesis that an accessory anatomical pathway uniting auricle to ventricle, described by Kent in 1893, permits an accelerated conduction of the cardiac impulse and so bypasses the atrio-ventricular node and the bundle of His and its branches.

In 1930 Wolff, Parkinson and White published an account of 11 patients whose cardiogram exhibited a *P–R* interval of 0·12 second, or less, a widened *QRS* complex often with a slurred ascent to the peak of *R*, altered *S-T* segments and *T* waves, and a tendency to attacks of ventricular tachycardia. The condition is usually a benign one, and its chief importance lies in its possible confusion with the electrocardiographic changes in ischæmic heart disease. More recently, it has been pointed out that prolongation of the *QRS* complex is not an essential component of the syndrome, and that an association or alternation with atrio-ventricular nodal rhythm can occur. There are several other known variations which are much rarer. Much printer's ink has been expended in explanations of this interesting but relatively unimportant phenomenon, the chief views being that some form of abnormal forward or backward conduction occurs through the normal auriculo-ventricular pathways, or that the impulse employs the bundle of Kent as a "short cut". Various workers have produced the characteristic complexes by artificially electrically uniting auricle with ventricle, or by mechanical stimulation of the interventricular system, and so have seemed to give support to the theory of an accessory pathway. Prinzmetal and his group were unconvinced by these experiments, and set about obtaining high-speed (200-5000 frames per second) motion pictures of the ventricular epicardium, together with simultaneous pictures of the movement of a direct writing electrocardiographic pen. In this way they were able to associate the complexes under investigation with details of visible ventricular dynamics. When such a film was shown at a normal speed, one cardiac contraction would occupy ten minutes.

In the first experiment "W.P.W." (Wolff-Parkinson-White) complexes were produced by mechanical stimulation of the epicardial and endocardial surfaces of the ventricles at a point remote from the atrio-ventricular node. By this method isolated "W.P.W" complexes, short runs of "W.P.W." aberration and runs of "W.P.W." complexes alternating with normal complexes were obtained. It is of interest to note at this point that "W.P.W." aberration has been known to occur in man during cardiac catheterization. The same changes were produced chemically by the application of 0·05% aconitine solution in benzene; but this was less efficient than mechanical stimulation. The investigation next demonstrated that the mechanical force of auricular systole is not a requisite factor in setting off a premature discharge in the ventricular wall to produce a "W.P.W." complex. The investigators were able, however, to stimulate the epicardium and endocardium of the ventricles electrically by using a direct current of insufficient intensity to initiate a full ventricular contraction. Such a subthreshold current so modified the area stimulated that normal excitation impulses smothered the "W.P.W." response. Most success attended stimulation of the endocardium of the right ventricle at or near the apex. All known clinical types of "W.P.W." phenomena were produced, but the shape of the "W.P.W." complex varied with the area stimulated. If the area was close to or at the atrio-ventricular node, isolated extrasystoles and tachycardia also occurred. These are frequent clinical companions of the "W.P.W." complex.

The authors mention that the thesis of aberrant atrio-ventricular correction by anatomical connexions cannot explain all the supraventricular arrhythmias seen in this syndrome, but they can all be reproduced when the same

[1] THE MEDICAL JOURNAL OF AUSTRALIA, April 26, 1952.

[2] "Accelerated Conduction: The Wolff-Parkinson-White Syndrome and Related Conditions", by Myron Prinzmetal, M.D., Rexford Kennamer, M.D., Eliot Corday, M.D., John A. Osborne, M.D., Joshua Fields, M.D., and L. Allen Smith, M.D.; 1952. New York: Grune and Stratton. 9" × 6", pp. 118, with 48 illustrations, one plate in colour. Price: $4.00.

area in the atrio-ventricular node which allows the production of "W.P.W." complexes is made to function as the pacemaker. Thus the concept is developed that a portion of the node is altered in such a way as to permit of premature conduction of the auricular impulse to a part of one ventricle. This ventricular area contracts first and is in diastole by the time the remainder of the ventricle is in systole. If so, the refractory area should be observed to bulge during the main ventricular contraction. Prinzmetal and his co-workers by means of their equipment were able to demonstrate this appearance photographically and record a "W.P.W." complex simultaneously. The premature localized contraction of the ventricle is associated with the premature appearance and slurring of the initial part of the *R* wave of the "W.P.W." complex. As a result of artificially severing the bundle of His it became impossible to reproduce "W.P.W." complexes by any of the experimental methods described. This, it is claimed, demonstrates that the impulse which produces the "W.P.W." complex traverses the normal conduction pathways and does not depend upon anomalous atrio-ventricular connexions.

The various forms of "W.P.W." complex found clinically have all been reproduced experimentally, and their variability appears to depend on the location of the area of stimulation and on its degree of prematurity. If this happens to be located on or near the septum, the whole ventricular mass will be discharged prematurely and in normal time. In view of these findings, the authors suggest the term "accelerated nodal conduction" as preferable to the "W.P.W. syndrome" when referring to the well-known congenital anomaly, clinically consisting of various forms of ventricular aberration, associated with paroxysms of supraventricular arrhythmia. Each aberrant complex would then be known as an "accelerated conduction complex".

In the clinical field, attention is drawn to the occurrence of accelerated conduction complexes of the nodal type following posterior myocardial infarction, which is said to indicate a mild involvement of the node, since more severe destruction of this tissue leads to heart block. These complexes were also observed during traction on the pulmonary artery during the operation of lobectomy, and are common in auricular flutter and fibrillation, provided that heart block does not coexist. Accelerated conduction of the ventricular type is frequent in all paroxysmal ventricular tachycardias, often occurring after myocardial infarction in an area remote from the atrio-ventricular node, or following the use of strophanthin or tetraethylammonium bromide. The ventricular type is less common than the nodal type. The mechanism by which a ventricular focus influences nodal conduction, and the pathology of the congenital type described by Wolff, Parkinson and White are unknown.

Once again Prinzmetal and his co-workers have succeeded in upsetting a classical hypothesis and suggesting a new one which better fits our knowledge of the physiology of the cardiac conduction system. They have provided thoughtful and provoking evidence for a theory which will probably supplement all others, and we shall hear no more of the bundle of Kent. Whatever else comes out of Hollywood, there can be no doubt of the quality and originality of the cardio-vascular research programme of the Cedars of Lebanon Hospital.

Current Comment.

THE LEVEL OF THE PERITONEAL REFLECTION IN THE SURGERY OF RECTAL CANCER.

WITH the revival of surgical endeavour to perform "restorative" resections of the rectum in a higher percentage of patients suffering from carcinoma, a clearer understanding and definition of the term "rectosigmoid" has become necessary. According to M. R. Ewing,[1] exact anatomical description is often disturbingly scanty in the literature; so that really convincing comparison between one type of resection and the next is impossible. Although the rectum has always been defined as beginning opposite the middle piece of the sacrum, at operation it is quite another matter for the surgeon to decide precisely where the colon ends and the rectum begins. The "rectosigmoid" is the "no man's land" in the region where the bowel gradually loses its mesentery. Technically, removal of a segment of the mobile sigmoid presents one problem, that of the fixed rectum another; where the first merges into the second the methods of resection applicable to the sigmoid can no longer be practised unmodified, and this is the "rectosigmoid". In addition, from the pathological point of view this portion of the colon seems properly to belong to the rectal segment. Despite this, the term "rectosigmoid" is an unsatisfactory one, for it is often applied loosely to an ill-defined length of bowel much of which should be called "sigmoid". When such higher growths are included with carcinomata of the rectum an increased incidence of restoration of continuity of the bowel will, of course, be possible, and a false impression will thus be given of the surgeon's dexterity. In surgical practice the site of a rectal cancer is often indicated by measuring the distance of its lower edge from the anal margin. This distance, however, may vary considerably, depending on factors such as the patient's position on the table or the tone of his sphincters, and on the presence or absence of any degree of intussusception of the tumour. The height of the tumour may be measured in centimetres or in inches, either in the living subject or in the resected specimen, which may be shrunken or stretched. The sigmoidoscope measures the shortest distance of the lower edge of a tumour from the anal margin, but when at operation the curves of the rectum are obliterated by its dissection out of the hollow of the sacrum, this length will be considerably increased. In view of this the most helpful landmark in the surgery of the rectum is the level of the peritoneal reflection, that is, the point at which the peritoneum passes forward to the bladder or vagina. The distance of this reflection from the perineum varies considerably (from five to ten centimetres), but it has the advantage of being easily recognized at operation and it is equally evident in the resected specimen. The pathological implications can be visualized by the surgeon from such a description. On sigmoidoscopy the level of the reflection can be recognized, for it coincides with Houston's third valve. Wood Jones's concept of the rectum consisting of two morphologically distinct portions has been confirmed by various studies of the lymphatic drainage of the rectum in the full-term fœtus. The injection of dyestuffs shows that the lymphatic drainage from the "perineal" part of the rectum is in three directions—downwards, laterally and upwards; whereas that from the "old" part of the rectum is entirely upwards. A sharp watershed is described between these two portions of the rectum and is situated at the level of the peritoneal reflection. Evidence that the prognosis in rectal cancer depends on the position of the tumour in relation to the peritoneal reflection is reviewed by Ewing, who states that it can be explained in a variety of ways. Firstly, the higher lesions occur in a less spacious portion of the bowel and give rise to obstructive symptoms earlier. Secondly, it is possible that for some time the peritoneum acts as a limiting investing layer. Thirdly, lesions below the peritoneum are not contained by a serous coat and spread

[1] *The British Journal of Surgery*, May, 1952.

early and widely in the neighbouring soft tissues, which cannot readily be resected. Fourthly, because of the bony pelvis the extent of the resection of tissues below the peritoneal reflection is rather restricted. Fifthly, local venous invasion may possibly occur more often with growths below the peritoneal reflection. Sixthly, the lymphatic drainage is different above and below the peritoneal reflection. Even so, the prognosis for all patients with carcinoma of the rectum submitted to operation compares very favourably with that of patients with carcinomata of other viscera.

THE ASSOCIATION OF CHRONIC ULCERATIVE COLITIS AND CARCINOMA OF THE RECTUM.

WHILE the cause of cancer of the rectum, like that of cancers elsewhere in the body, continues to escape detection, there are certain lesions, such as familial polyposis and bilharziasis of the rectum, which may be classed as premalignant. Chronic ulcerative colitis has also been incriminated; and the association of chronic ulcerative colitis and carcinoma of the rectum has recently been reviewed by P. B. Counsell and C. E. Dukes,[1] who describe 13 cases of carcinoma of the rectum following chronic ulcerative colitis and find two characteristics common to all 13 cases. Firstly, the outward appearance of the malignant tumour is unusual. The tumour may be unrecognizable by the unaided eye, because in this altered soil growth proceeds in an unfamiliar way. The tumour may not be visible as a swelling or ulcer on the mucosal surface, but it may manifest itself only as a dense fibrous-looking stricture with ill-defined boundaries, resembling an inflammatory rather than a neoplastic lesion. Secondly, when carcinoma follows chronic ulcerative colitis it usually grows rapidly. In nearly all the cases in this series the tumour was anaplastic in character, having the histology of an undifferentiated colloid carcinoma or an adenocarcinoma of high-grade malignancy. These growths were exceptionally invasive in character, spreading intramurally by infiltration within the submucosa and muscle coat, well beyond the visible boundaries of the surface lesion. Lymphatic spread also occurred at an unusually early stage. In the series only one tumour had not given rise to lymphatic metastases, whereas in other cases of cancer of the rectum and colon operated on during the same period approximately half showed no lymphatic spread. Finally, in cases of cancer following chronic ulcerative colitis the average number of lymphatic metastases is greater than for other cases. All this indicates a bad prognosis, which Counsell and Dukes's follow-up records abundantly confirm. It is pointed out that the atypical appearance of the primary tumour is the direct consequence of exceptionally rapid and invasive growth, and that these two factors are closely interrelated. Very similar appearances result from the rapid growth of an anaplastic carcinoma which has not been preceded by chronic ulcerative colitis. The divergence of opinions in the literature about the relationship of pseudopolypi to the development of carcinoma is probably due to the failure to discriminate between different varieties of polypi. The polypoid lesions which occur in chronic ulcerative colitis are of three quite distinct varieties. The first are mucosal tags, which are simply surviving fragments of mucous membrane still anchored to the bowel wall but projecting into the lumen. They follow the ulcerative stage of the disease. They have a ragged appearance and on section are seen to be composed only of irregular tags of mucous membrane. Secondly, there are inflammatory polypi, which are more rounded in appearance and are often pedunculated. They are usually much paler than adenomata. In the early stages they are composed of mucous membrane and granulation tissue, but at a later stage they consist only of a compact core of connective tissue covered by fairly normal-looking glandular epithelium. They may disappear spontaneously and often do so. They are not in any sense precancerous. The third variety are adenomatous polypi, which are much less common. They have the same rounded outline and are also pedunculated, but they differ from inflammatory polypi in being darker in colour and firmer in consistence. On section they are found to be partly composed of closely packed, non-mucus secreting, columnar epithelial cells with hyperchromatic nuclei. They are true adenomata and are definitely precancerous in the sense that cancer often develops within them. It is therefore stressed that special care is needed in the supervision of any patient who has chronic ulcerative colitis and who is known to have adenomatous polypi in the rectum. Although cancer following chronic ulcerative colitis may begin in an adenomatous polypus, it is not considered that it does so often; and the fact that carcinoma so frequently develops without any visible or recognizable neoplastic lesion on the surface has not received sufficient attention in the past. The true incidence of carcinomatous change in chronic ulcerative colitis is difficult to assess. In their series of 63 cases of chronic ulcerative colitis treated surgically, Counsell and Dukes found that 52 patients were known to have had the disease for ten years or less, and in this group there were only two cases of carcinoma. On the other hand among the 11 patients with a history of ulcerative colitis for more than ten years there were five cases of carcinoma. This emphasizes once more the fact that the period during which carcinoma is most likely to develop is after the colitis has been in existence for ten to fifteen years, which is remarkably similar to what has been observed in familial polyposis. The age of onset of chronic ulcerative colitis is significant, in that the incidence of carcinoma was nearly twice as high when the colitis started before the age of sixteen years. The severity of the disease may be another factor affecting this incidence. Possibly the commoner and milder forms of chronic ulcerative colitis are less likely to be followed by carcinoma; and if this is so, it partly explains the wide variation in the findings of different authors concerning the incidence of carcinoma in chronic ulcerative colitis. The assessment of carcinomatous change is further complicated by surgery, since it is not unlikely that some of the patients submitted to colectomy would have developed carcinoma had the colon not been removed. Counsell and Dukes repeat the warning that it would be easy to overlook a carcinoma following chronic ulcerative colitis even at post-mortem examination, and the clinical diagnosis is even more liable to error. The early symptoms of malignant change may easily be attributed to an exacerbation of the colitis, and later symptoms such as intestinal obstruction may equally be ascribed to the development of inflammatory stricture. It is for these reasons that malignant disease has often been overlooked in the past and its incidence under-estimated in relation to chronic ulcerative colitis.

[1] *The British Journal of Surgery*, May, 1952.

A JOURNAL OF SCIENTIFIC ILLUSTRATIVE METHODS.

THOSE who are concerned with scientific illustrative methods executed photographically or by hand will be interested to learn of the new quarterly publication, *Medical and Biological Illustration*, now being published by the British Medical Association. Attractively produced and well illustrated, it sets out to provide detailed information on all aspects of the illustration of papers on scientific work. It is the only journal that we know of covering this field and admirably meets a real need. In addition to the many contributed articles, it has a section on equipment and methods, abstracts from a wide range of literature, book reviews, a motion picture section including film reviews, and relevant reports from various societies. This journal should have a warm welcome as it becomes more widely known.

Abstracts from Medical Literature.

PÆDIATRICS.

Prognosis in Acute Glomerulonephritis.

H. J. HERBERT (*The Journal of Pediatrics*, May, 1952) reports a follow-up on a group of adults who had had acute glomerulonephritis in childhood. Of a group of 130 children, 26 were traced after an interval of twenty years. These had remained free of urinary tract disease, and blood pressure readings and urinary examination by the method of Addis showed normal findings. No evidence of chronic nephritis was found in any patient.

Acute Appendicitis in a Premature Infant.

JOHN F. MEYER (*The Journal of Pediatrics*, September, 1952) reports the occurrence of acute gangrenous appendicitis in a premature infant weighing 1590 grammes. A clinical description, an autopsy report and a review of some of the literature on neonatal appendicitis are given.

Constitutional Sexual Precocity.

STUART H. WALKER (*The Journal of Pediatrics*, September, 1952) reports a family showing precocious androgen activity in many of its male members. The two members of the family studied were a boy of four years and his father, aged twenty-eight years. In both there was an early genital and somatic growth becoming obvious from about the age of two years, and so pronounced that the four-year-old boy had the body of a well-developed boy of eight years, with adult musculature and adult penis, scrotum, testicles and pubic hair. There was no axillary or facial hair. Spermatogenesis was present. There was as yet no abnormal sex interest, and he was well adjusted intellectually and socially with his contemporaries. His excretion of 17-ketosteroids was only 7·77 milligrammes per twenty-four hours and of gonadotrophins less than 50 international mouse units. No intracranial or suprarenal abnormality could be demonstrated. The father had had similar precocious development commencing at two years of age. His excretion of 17-ketosteroids was 4·32 milligrammes per twenty-four hours and of 11-oxysteroids 1·4 milligrammes. He had had a cousin, father, two uncles and a grandfather affected in the same way. They lived essentially normal lives, growing into adults whose only apparently abnormality was some stunting of growth. Of the seven persons affected, five had become fathers.

Hypertrophic Pyloric Stenosis.

H. F. RHEINLANDER AND ORVAR SWENSON (*The Journal of Pediatrics*, September, 1952) present a clinical review of 100 cases of pyloric stenosis. All patients had projectile vomiting, usually of freshly taken feeding, but in a few cases there were streaks of blood and in one coffee-grounds. Gastric peristaltic waves were present in all cases, but the authors point out that these can occur in other conditions. The pyloric tumour was palpated in 90% of the patients, and this is the sign of greatest diagnostic value. The tumour is felt by pressing down through the right rectus muscle above the umbilicus, the examiner standing on the left side of the patient and using the finger-tips of the left hand. Palpation is best carried out when the child is feeding or just after it has vomited. The tumour is compressed and rolled against the spine. Patients with a typical history but without a palpable tumour were submitted to radiological examination, the typical finding of a narrowed and elongated pyloric canal being a much more reliable finding than slow emptying of the stomach. If necessary electrolyte studies and replacement were carried out before operation. If vomiting was severe or the stomach much dilated, gastric suction was maintained till operation was performed. For operation ether and oxygen anæsthesia was used, with a gridiron subcostal muscle-splitting incision lateral to the right rectal muscle. Details of the operative procedure are given. The skin is closed with fine catgut, a collodion dressing applied, and the child allowed home in three or four days. Post-operative feeding is simple. As soon as peristalsis is audible, usually four to six hours after operation, the baby is given 30 millilitres of 5% dextrose solution each two hours. After twelve hours this is changed to normal milk mixture 30 millilitres each two hours, gradually increasing in amount until the child is having normal full feeding by the end of forty-eight hours.

Retrolental Fibroplasia.

EIRLYS JEFFERSON (*Archives of Disease in Childhood*, August, 1952) reports a study of 56 premature infants suffering from retrolental fibroplasia. Each premature infant whose condition allows it is submitted to thorough ophthalmoscopic examination at the age of seven days, then each week while in hospital, and then each fortnight till the age of six months. In suspect cases the patients are examined more frequently, and the retinal appearance has been found to change beyond recognition in a few days on several occasions. Changes have commenced as early as at eight days and as late as at five and a half months. The earliest change is excessive fullness of the retinal veins, then tortuosity of arteries and veins. Soon the retina becomes œdematous, and new blood vessels appear. Retinal hæmorrhages may appear. The new vessels proliferate and extend into the vitreous; mild papillœdema, extensive retinal œdema and retinal detachment follow. Fibrous tissue develops at the periphery of the retina and extends across the retina, and leucokonia becomes established in an average time of two months. In a considerable number of babies the initial changes in retinal vessels were not followed by membrane formation, the disease appearing to have become arrested. In advanced cases microphthalmos, progressive shallowness of the anterior chamber and degeneration of the iris develop. Occasionally corneal opacities or glaucoma may occur. The authors reexamined a large proportion of premature babies born since 1947. Before 1949 only one case of retrolental fibroplasia was found. In 1949 oxygen tents were adopted for all infants under three pounds' weight, and the incidence of the disease among them increased. In 1950 all premature infants were nursed in oxygen tents, and babies above three pounds in birth weight developed retrolental fibroplasia. This happened after the babies had been removed from a high oxygen atmosphere. It was found that return of the baby to a high oxygen atmosphere caused reversal of the early vascular changes in the eye. So since October, 1951, oxygen administration has been reduced to a minimum and its withdrawal carefully graded, and the incidence of the disease has diminished.

Polyostotic Fibrous Dysplasia.

R. H. VINES (*Archives of Disease in Childhood*, August, 1952) reports two cases of polyostotic fibrous dysplasia and discusses the condition. He states that it occurs in childhood, the lesions becoming arrested in adult life. A number of bones develop cyst-like areas, in which bone marrow is replaced by dense fibrous tissue containing some residual bone trabeculæ. The disease tends to affect the bones developed from one limb bud, or to be unilateral. The proximal long bones and base of the skull are most affected. The overlying bone cortex becomes thinned and expanded, resulting in deformities, bending or pathological fracture of long bones. Sclerosis of the base of the skull may cause compression of cranial nerves. *Café-au-lait* patches on the skin are seen in most cases, the edges of patches being irregular in contrast to the smooth edges seen in cases of neurofibromatosis. Sometimes there is precocious skeletal growth, causing rapid early growth of the child and subsequent dwarfing. Sexual precocity is common in females but rare in males. Serum calcium and phosphorus values are normal. The serum alkaline phosphatase level may be raised.

ORTHOPÆDIC SURGERY.

Osteomyelitis in Infants.

DONALD W. BLANCH (*The Journal of Bone and Joint Surgery*, January, 1952) states that acute hæmatogenous osteomyelitis in infants runs a rapid course. The diagnosis is often made late, after irreparable damage to joint components and growth centres has already taken place. Normal temperature and absence of general reaction to infection are often misleading. This disease should be suspected if an infant becomes irritable and if swelling, tenderness or loss of function of an extremity develops. The author believes that there is little controversy concerning the general treatment of the sick infant, but the present tendency is to pay too little attention to the local bone and joint lesion. The intra-articular tension and lytic action of pyogenic exudate in pyarthrosis of the hip rapidly destroy cartilage, thus causing disruption of the joint, pathological dislocation and serious growth disturbances, which result in severe crippling. In those dislocated hips which were later observed at open operation, it was found that internal rotation was necessary to place the remaining elements of the proximal end of the femur into the acetabulum. The author considers that the chief fault in present-day treatment is the tardiness of surgical drainage of localized abscesses, particularly when a hip joint is involved. Study of this series suggests that early surgical drainage, followed by traction in abduction,

particularly with internal rotation, would have minimized absorption of cartilage and saved some of these hips.

Tissue Differentiation in Malignant Synovial Tumours.

E. S. J. KING (*The Journal of Bone and Joint Surgery*, February, 1952) describes in detail the main clinical and pathological features of malignant synovial tumours. He states that their classification is made on a histological and not a histogenetic basis. The tumours occur mostly in the third decade and are rather more common in men. They present as swellings, usually painless, found rather more frequently in the lower than in the upper limbs; they are usually in close relation to joints, bursæ or tendon sheaths, but sometimes develop apart from the actual synovial membrane. They grow rapidly and induce the appearance of a pseudo-capsule. When arising near synovial membranes they grow away from them rather than into them. They are firm in consistence and may contain areas of fibrosis, calcification, cyst-development or mucoid change, which may be blood-stained. The histological appearances vary not only from case to case, but in different parts of the same tumour The following tissues are found: (i) Spindle-cell tissue indistinguishable from that found in any active tissue sarcoma. (ii) Special synovial tissues—(*a*) mucoid tissue which may become cystic in areas; (*b*) groups of large spheroidal or irregular cells containing a large amount of clear protoplasm in which there are droplets; (*c*) synovial surface tissue with spaces, the spaces possessing a lining which closely resembles synovial tissue and often showing, in miniature, all the characters of synovial cavities; (*d*) endothelium-lined spaces and "glands", the cells lining which may undergo change to cells indistinguishable from endothelium and may even further differentiate into an "epithelial" form giving an appearance of epithelium-lined glands; (*e*) spheroidal epithelium-like cell forms, which are a further differentiation. The author considers that the various kinds of cells are closely related to each other and may be transformed into each other, and that as a proportion of them may be found away from joints or other recognizable synovial structures, the opinion that these tumours come from a synovial membrane is pure hypothesis. He believes that, given the appropriate stimulus, connective-tissue cells anywhere are capable of forming synovial tissue and cites the occurrence of false bursæ and false joints; he offers this as an explanation for the otherwise unexplainable occurrence of these tumours away from normal synovia.

The Articulation Between the Second and Third Cervical Vertebræ.

LEWIS M. OVERTON AND J. W. GROSSMAN (*The Journal of Bone and Joint Surgery*, January, 1952) found after anatomical investigation of cervical vertebræ that variation commonly occurred in the symmetry, the angle of inclination and the size of joint surfaces of the apophyseal joints of the second and third cervical vertebræ. A recent study by one of the authors has shown that in 21 (11·3%) of 186 cases of cervical radicular pain the pain was localized to the third cervical nerve segment, namely, the scalp over the post-auricular, occipital and posterior parietal regions as far forward as the vertex of the skull. In every case in this group variations were revealed, through X-ray films, in the apophyseal articular processes of the second and third cervical vertebræ. The authors believe that these findings tend to substantiate the hypothesis that irritation of the third cervical nerve does produce occipital headaches. They state that the post-orbital and frontal headaches are more difficult to explain. They suggest that the sensory nerves arising from each cervical nerve to join the cervical sympathetic system may carry similar pain impulses to that portion of the brain supplied by the carotid plexus with a resulting arterial spasm. That similar headaches accompany nerve-root irritation in the lower portion of the cervical spine offers some support for such a hypothesis.

The First Rib and the Scalenus Anterior Syndrome.

A. F. WILLIAMS (*The Journal of Bone and Joint Surgery*, May, 1952) states that in the *scalenus anterior* syndrome when no anatomical abnormality is found symptoms are due to tension on the neuro-vascular bundle, and in particular the first thoracic nerve, as they cross over the first rib. The operation that seems most likely to help is resection of the first rib, and it is suggested that "first rib syndrome" would be a more apt name for the condition. The anatomy of this region was investigated in 11 adults and three fœtuses (28 dissections) to determine any anatomical causes for the symptoms in cases with apparently normal radiographic appearances. The author considered that the most striking feature was the course taken by the first thoracic nerve and, to a lesser extent, the lowest trunk of the brachial plexus. In its course the first thoracic nerve forms a well-marked loop over the first rib, and because of this loop the nerve is peculiarly vulnerable, for downward traction on the arm pulls the nerve and lower trunk more firmly against the first rib. This is the position in which patients with *scalenus anterior* syndrome have most trouble, whereas raising the arm often eases the symptoms because at the same time the nerves are drawn away from the rib. The second feature noted was that the neuro-vascular bundle emerges from behind the posterior border of the *scalenus anterior* and runs downwards and laterally from it. The author believes that in the absence of any posterior abnormality the *scalenus anterior* could not cause any pressure on this bundle. In four of the 22 adult dissections the anterior border of the *scalenus medius* was raised two or three millimetres above the edge of the rib in a sharp tendinous edge. The author believes that this sharp edge is more likely to cause injury than the usual smooth surface of rib and muscle. It was found that the interval between the attachments of the two scalene muscles to the first rib was variable. In nearly half the subjects the bony insertions were almost continuous. The author considers that any explanation of the *scalenus anterior* syndrome in the absence of a cervical rib or *scalenus minimus*, a ligamentous band or similar abnormality must be consistent with the following facts: (i) The syndrome is more frequent in women than in men. (ii) It arises most commonly between the ages of twenty and forty years. (iii) The right arm is the one generally affected. All these factors can be accounted for by pressure or traction on the first thoracic nerve as it crosses the first rib.

The Osteoporosis of Immobilization in Recumbency.

F. HARWOOD STEVENSON (*The Journal of Bone and Joint Surgery*, May, 1952) in a study of the osteoporosis of immobilization in recumbency realized that epiphyseal disruption and premature fusion at the knee were only part of a much larger problem. Eighty-five patients were studied during a period of five years—about a third after activity had been resumed and the remainder during immobilization with bed rest. All had been or were immobilized without suspension for at least three months, but a large proportion for one or more years. Fifty-five had tuberculosis of the spine or one or more joints of the lower limb. The rest had rheumatoid arthritis or anterior poliomyelitis. Fourteen were under the age of five years; 39 were aged from five years to the age of epiphyseal fusion; 32 were adults. Prolonged immobilization, even when the lower limbs are entirely free from disease, produces both in children and in adults gross radiographic changes in the lower limbs which illustrate clearly the disturbance of calcium metabolism. The author points out that the essential factor is prolonged immobilization, as the radiographic picture is the same in a lower limb no matter what the disease or where it may be. The common picture includes a generalized decrease of bone density, a zone of more intense porosis at the original site of the metaphysis, a narrower zone immediately deep to the cortex of the bone ends, and further irregularly distributed patches. The author believes that in some cases the loss of cancellous bone in an infected joint may be due far more to mechanical disintegration during the stage of intense porosis than to destruction by tuberculous granulation tissue. This point indicates the importance of obtaining the benefit of local rest, but without an intense negative calcium and nitrogen balance. Recalcification at the site of disease, even while the region is still immobilized, is generally accepted as evidence of healing. The maintenance of a positive calcium balance should hasten healing by facilitating such recalcification and must help to prevent the mechanical collapse of osteoporotic cancellous bone. The author points out that apart from the epiphyseal changes described by Gill very undesirable local results from general loss of bone occur commonly. When a child under ten years of age is rested on a Jones double abduction frame for more than three or four months, the chest begins to flatten. The effect on respiratory movements of the thoracic cage in severe cases is to bring the ribs down into the expiratory position; inspiratory movement of the ribs is reduced, and breathing may even become almost entirely diaphragmatic. This deformity is prevented by the use of a moulded plaster bed which supports the side of the chest. Breathing exercises are also useful to prevent the extreme loss of intercostal movement. Minor falls during remobilization frequently produce fractures which may occur even in bed. Unilateral *coxa valga* is readily produced in young children who have one lower limb immobilized in a Thomas splint for disease of the knee.

Special Articles for the Clinician.

(CONTRIBUTED BY REQUEST.)

XLIII.

WARTS.

A WART or verruca is a small, circumscribed, autoinoculable, epidermal and papillary growth of variable size, shape and consistency. Several clinical forms are recognized; all have the same essential histological characteristics.

Verruca vulgaris or the common wart is often situated on the hands or fingers. The warts may be single or multiple round, oval or irregularly shaped papilliform excrescences, varying from a pinhead to a pea in size. In colour they are greyish, yellowish or brownish. The lesions are usually discrete, but they may coalesce to form rough patches. Warts may be pedunculated or sessile. They may be single, few or many. They are most common in young people.

Digitate warts are characterized by the presence of several or many filiform projections, with horny caps, closely grouped on a narrow base, which may itself be separated from the skin by a slightly constricted neck. This variety occurs most commonly on the face and scalp.

Plantar warts are similar to the common wart, except that they occur on the soles of the feet and project inwards from pressure. They are situated anywhere on the feet, but are most frequently located over one or more of the metatarso-phalangeal joints, commonly the second. These warts are sensitive to pressure, and the manipulation gives rise to a pricking sensation like that caused by a thorn in the foot. There is often a hyperkeratotic or horny ring over and around the wart, and when this is removed by a sharp knife or a salicylic acid plaster a peculiar well-like cavity, partly filled with moist, tough, tow-coloured corneous material is exposed. In this central core are seen tiny dark points, which are really coagulated blood on the tips of the enlarged papillæ. If the tops of the warts are pared down further, bleeding takes place from the vessels in the papillary tips. Plantar warts must be distinguished from callosities. In these, when they are pared down and swabbed with spirit, there is no break in the papillary lines, whereas in plantar warts there is. Another wart occurring on the sole of the foot is the mosaic wart, described by Montgomery in 1928. The mosaic wart is a multiple, patchy lesion limited to the sole, although occasionally it is situated between the toes. Warts of this type appear most commonly as patches of various size on pressure points on the sole, especially beneath the metatarsal heads and the heel. They are irregularly bordered, dry, and topped by a rather granular, friable, horny mass. They are usually painless. After the lesion has been pared there is an area composed of soft corn-like segments so closely packed together that those in the central part have angular rather than rounded borders; hence the term "mosaic". The individual cell or core is usually from two to three millimetres in diameter. Patches vary in size from that of a pea to five centimetres or more across. Numerous outlying patches may be found singly or in groups. Coincident with plantar warts there may be widely scattered warty lesions on the hands, the fingers or the dorsa of the feet.

Filiform warts are small, slender, flexible, thread-like growths, covered with smooth and apparently normal epidermis. Common sites are the eyelids and the neck. The lesions are usually single, but may be multiple and sometimes discrete and grouped.

Verrucæ planæ juveniles or juvenile flat warts are seen most commonly on the face, the forehead and the dorsal surfaces of the hands. They are small, square or polygonal, flesh-coloured, yellowish or brownish, pinhead-sized to pea-sized flat or domed growths. There is as a rule a tendency to grouping. Sometimes there is a linear arrangement along a scratch mark or abrasion.

Acuminate warts, sometimes called *condyloma acuminatum*, develop near the muco-cutaneous junctures and in other moist situations. They are sometimes known as venereal warts. The formations consist of closely aggregated collections of pointed, tufted or pedunculated pinkish projections of varying length and consistency. If situated on moist localities, they become covered with pus and decomposed secretions and may give off an offensive odour. On account of friction, heat, moisture and a good blood supply they grow luxuriantly and by lateral extension may involve areas of considerable extent. They are apparently autoinoculable.

With the possible exception of the filiform wart, all the warts mentioned are considered manifestations of a virus infection. Variot (1893) reported the first successful inoculation of warts. Cuiffo showed that the infective agent could be filtered. The usual incubation period is one to eight months. Immunity to the virus has been demonstrated, and its spontaneous development probably accounts for the sudden disappearance of the lesions. Some individuals are more susceptible to the virus than others. There seems to be a greater susceptibility in some persons to become inoculated with the virus, and on the other hand others may handle warts with impunity.

Treatment.

Some warts respond easily to treatment, but others are resistant. In consequence there are many different forms of treatment. The following methods have been used.

Psychotherapy.

Suggestion is well worth a trial, especially in the treatment of children. Bloch recommends suggestion, and considers that warts can be cured in this way. One can paint warts in children with a coloured preparation, such as gentian violet or Castellani's paint, and assure the child that the warts will gradually shrink and disappear over the course of several weeks. The parents can be "let into the secret" and cooperate by keeping up the suggestion. Spontaneous resolution of warts can occur, and may account for some of the "cures" from psychotherapy. Often when one or two warts are successfully treated in a group of warts, especially if they are the largest or so-called "mother" warts, the others may disappear as well. Possibly some specific antibody has been formed.

Oral and Parenteral Treatment.

Orally administered preparations which have been credited with the cure of warts are the following: *Liquor Calcis* (lime water), one ounce three times a day; green iodide of mercury, one-sixth to one-quarter of a grain three times a day; magnesium sulphate in aperient doses; *Liquor Arsenicalis*, one to three minims three times a day; and thyroid extract. Success has been claimed for the intramuscular administration of bismuth salicylate or "Rubyl" once a week.

Chemotherapy.

Local chemotherapy is used in the form of chromic, nitric, monochloracetic, trichloracetic, carbolic or glacial acetic acid in concentrated liquid form. Some workers use salicylic acid (10%) in collodion. When one is using strong acids, such as nitric, monochloracetic or trichloracetic acid, care should be exercised to see that none of the acid gets onto the surrounding skin, which can be protected by a ring of "Vaseline" or zinc paste put round the wart. For juvenile flat warts the local application of Vleminckx's solution or a saturated solution of magnesium sulphate is recommended, and mercuric ammonium chloride (1%) in zinc paste is sometimes successful. Local applications to plantar warts are not likely to be successful unless the wart is pared down with a sharp knife until little bleeding points appear. When this has been done, the wart can be painted with trichloracetic acid and then surrounded with adhesive tape or a piece of tape with a hole cut in it the size of the wart. Into the central hole is then applied a drop or two of podophyllin (25%) in *Tinctura Benzoini Composita*. The whole area is then covered with another piece of adhesive tape and left for twenty-four hours. The wart is pared every three or four days, and the podophyllin paint is reapplied for twenty-four hours every seven days. If effective, the treatment takes four to eight weeks. Upton claims a fair amount of success from a paste consisting of 360 grains of salicylic acid and 60 grains of trichloracetic acid in glycerin sufficient to make a paste. This is applied, after the wart has been pared, through a hole in adhesive plaster for four days. The hole should not be larger than the wart, and the paste is kept in by a covering of adhesive plaster. The procedure is repeated twice.

Plantar warts can be successfully treated in some cases by the application of a 5% aqueous solution of formalin for ten minutes every night. Care should be taken to confine the formalin solution to warts only, as formalin can cause dermatitis. The toes and interdigital spaces may be smeared with "Vaseline" to protect the unaffected skin. Mosaic plantar warts can be treated with the salicylic acid and trichloracetic acid paste and with 5% formalin solution. For acuminate warts the best treatment is the application of podophyllin, a 25% solution in either liquid petrolatum or spirit. Care should be taken to keep the application on

the wart only, and it should be washed off in twelve hours if inflammation of the surrounding skin or mucous membrane is to be avoided. As the oily solution is apt to spread, it is better to incorporate the podophyllin in spirit or in *Tinctura Benzoini Composita*. The surrounding skin can be protected with zinc paste applied before the warts are treated. The paste can be removed in ten hours, and a mild antiseptic ointment applied night and morning. A second or third application may be necessary when the reaction has settled down.

Other Methods of Treatment.

Warts may be excised, but this procedure sometimes leaves a painful scar, especially on the sole of the foot. One of the most reliable treatments for warts is by the galvanocautery, as the exact amount of tissue and the depth can be accurately gauged. After the warty tissue has been punctured and coagulated it is removed by a small curette, and light curettage of the base can be followed by further application of the cautery at a dull heat. Scarring can occur if the operator goes too deeply. Diathermy can also be used, but the amount of tissue destroyed cannot be so accurately determined as when the galvanocautery is used. Keloid and hypertrophic scars are more likely to occur with diathermy. Warts can also be treated by the application of the carbon dioxide pencil, for periods of thirty to sixty seconds to small warts and up to four or five minutes to large warts on the soles which have a keratotic ring round them. A mask cut out of blotting-paper to the size of the wart saves cutting the pencil to a particular shape. This method is painful, and on the feet the discomfort may last for one or two days. Carbon dioxide slush can also be used. This is made by mixing powdered carbon dioxide snow with acetone and painting it on with a cottonwool tipped applicator or brush until a hard button is formed. Warts can be treated by X rays or radium. It is better to confine the use of these methods to the treatment of plantar warts which are considered suitable. Warts over bony prominences and on areas subject to pressure, especially in older people whose plantar fat is thin, are best treated by other methods.

FRANCIS C. THOMPSON,
Sydney.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on July 31, 1952, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. R. H. MACDONALD, the President, in the chair.

B.C.G. Vaccination.

PROFESSOR FRANK J. FENNER (Australian National University, Canberra) read a paper entitled "Vaccination Against Tuberculosis with B.C.G. Vaccine" (see page 767).

PROFESSOR H. K. WARD expressed appreciation of Professor Fenner's clear exposition of the subject of B.C.G. vaccination. He said that his only criticism was that Professor Fenner had been too modest in relation to his own contribution to the subject. Professor Fenner needed to be instructed in what a Mexican friend of Professor Ward's had called "blowing into the horn". The same Mexican friend had said that Calmette was a master of "blowing into the horn", but that was no reflection on Calmette's ability. Professor Ward went on to say that twenty-six years previously he had been to a conference in Philadelphia on the subject of tuberculosis, and the chairman at that conference had said that tuberculosis was caused by an acid-fast bacillus, that those infected became hypersensitive to the bacillus, and that that was all that was known on the subject. Professor Ward said that since then some additions had been made to the knowledge of the subject, but tuberculosis was still a very puzzling disease. There were two schools of thought on its control. One school advocated the use of B.C.G. vaccine, the other said that if there were enough sanatorium beds and complete control was exercised of patients with "open" tuberculous infections, the results would be as good as those from vaccination. The question might be asked whether B.C.G. vaccine was used to save the money and trouble involved in finding patients infected with tuberculosis. Professor Ward wondered what Professor Fenner thought about the matter. He asked whether one could really reduce the incidence of tuberculosis as much by public health measures as by B.C.G. vaccination.

DR. COTTER HARVEY expressed his appreciation of Professor Fenner's paper and of the opportunity to hear a world authority state the case for B.C.G. vaccination. He said that he would like to take up Professor Ward's question, as it was a public health matter, and Professor Fenner had disclaimed any first-hand knowledge of that aspect of the subject. Dr. Harvey quoted the results obtained in Minnesota, where, by public health measures, striking success had been achieved in the control of tuberculosis, resulting in the lowering of the mortality to 10 per 100,000 of population. As a corollary, the incidence of reactors to the Mantoux test had fallen sharply, and in many of the rural schools not a single pupil gave a positive reaction. For those and other reasons, Professor J. Arthur Myers, of Minneapolis, was opposed to B.C.G. vaccination. In the control of the disease it was axiomatic that sufficient beds be available in hospitals and sanatoria to accommodate all patients, and in that regard Australia was still a backward country. The essential point was that if all infective tuberculous patients could be isolated the problem of tuberculosis would be solved. They were moving towards that solution in some parts of the United States and Scandinavia. It seemed right that B.C.G. should be used until that goal was attained, but, of course, all other methods of public health and preventive medicine should also be employed in order to prevent the spread of infection, either from cattle or from human beings. Referring to the Royal Melbourne Hospital results quoted by Professor Fenner, Dr. Harvey said that he accepted them as proof of the value of B.C.G. They had been matched in New South Wales in two hospitals he knew of where B.C.G. vaccination of nurses was practised. In those hospitals no cases of tuberculosis had been detected radiologically in nurses during the past eighteen months. No system of screening of patients was practised in the hospitals, and therefore the potential risk of infection was present for all nurses. Dr. Harvey considered that B.C.G. was responsible. He concluded by asking Professor Fenner's opinion about the question of allergy in the skin reaction to tuberculin in its relation to immunity. He referred particularly to the nurse with the positive Mantoux response after B.C.G. which became negative in six months or so. Should such nurses go into a tuberculosis ward? Dr. Harvey himself thought that they should, and that they had some immunity; but he would like to know if there was any further evidence on the question.

DR. F. W. A. CLEMENTS said that he had been in the councils of the World Health Oaganization when they were considering the extension of work on B.C.G. vaccination from Europe to the Middle East and to Asia. He wondered if there was enough evidence from the work in Europe to warrant an international body sponsoring the vaccination of ill-nourished, under-developed people, and if there was any risk that the organisms might become virulent. He said that the World Health Organization discussion had been emotionally charged, as the representatives present of under-developed countries naturally wanted the advantages for their own countries that had been enjoyed by the European countries. There had apparently been no evidence of ill-effects on the 11,000,000 people in Europe who had been vaccinated in the immediate post-war period; but he wondered if Professor Fenner knew anything of the subsequent results in Europe, and if he would express an opinion on the effect of B.C.G. vaccination amongst under-developed, undernourished people, as there was a scheme for the vaccination of people who might come in those categories in territories in which Australia was interested.

DR. C. G. BAYLISS said that B.C.G. vaccination was one of the most urgent problems confronting students of tuberculosis. If a vaccine was available that was an effective means of protection, it must be the most valuable weapon in the campaign against tuberculosis. Figures had been published in support of the view that B.C.G. vaccination was most effective, but Dr. Bayliss wondered just how reliable those figures were. It was of particular interest that a spectacular fall in the incidence of tuberculosis had occurred in Iceland, where B.C.G. vaccination had been little used. In Denmark, during the ten years prior to 1950, the incidence had decreased only slightly, although B.C.G. vaccination was used extensively in that country. In Canada during the same period the incidence had actually risen, although B.C.G. was used in some Provinces there. In Brazil B.C.G. vaccination had been extensively employed. The overall mortality had been halved in recent years; however, the mortality in children aged under ten years had shown only a small decrease, and that in infants had actually increased, although vaccination of newborn infants had increased from 44% to 67% during the same period. Dr. Bayliss wondered

whether B.C.G. was always safe under all circumstances; those facts needed explaining. Dr. Bayliss said that the figures for mortality and morbidity from tuberculosis were not often correlated. It was important that reports from centres where B.C.G. vaccination was used should show not only the mortality but the morbidity from tuberculosis. In Australia comprehensive Mantoux-testing surveys should be carried out before any thought was given to the general use of B.C.G.

Professor Fenner, in reply, thanked Dr. Cotter Harvey for answering Professor Ward. He said that the classical example of the control of tuberculosis by measures other than B.C.G. vaccination was the work in Minnesota, as Dr. Harvey had said. When a well-developed, energetic campaign against tuberculosis was carried out, the results would seem to be as good as those obtained with B.C.G. vaccination. However, there were many places in which it seemsd unlikely that such a campaign could be carried out during the next ten or twenty years, and in the meantime it was probably better to use B.C.G. vaccination. In answer to Dr. Harvey's question about allergy and immunity in relation to the tuberculin skin reaction, Professor Fenner said that no information was available. The tuberculin test was taken as an indication of infection, though its limitations as an index of immunity were realized. No satisfactory test of immunity was known. With regard to Dr. Clements's question about the results of the campaign in Europe, Professor Fenner said that he knew of no data on the morbidity or mortality in centres where the campaign had been carried on. He had seen no report of untoward effects amongst the undernourished populations in post-war Europe. Such effects had been either not observed or not published; but he thought it most unlikely that, if they had been observed, they would not have been published, and the absence of reports suggested that no such effects had occurred. Amongst laboratory animals an alteration in such factors as the nutrition of mice could greatly accelerate the process of infection with virulent organisms; but there was no evidence that, with the exception of silicosis, such factors could alter the resistance of the host to B.C.G. In answer to Dr. Bayliss, Professor Fenner said that he had not personally followed the public health aspect. In many of the published results an assessment of both the morbidity and the mortality had been made; but there was difficulty in assessing the significance of morbidity figures. For example, the present tendency to use mass X-ray investigations made it difficult to compare present figures with those in past years, when many cases were probably not detected in the absence of a mass X-ray examination. It was difficult to discuss results obtained in South America, as in places unsatisfactory methods had been used, such as oral administration of the vaccine. In Sweden, where vaccination of the newborn had been carried out, not one case of tuberculous meningitis had been met with, a fact which suggested that the morbidity there was less than it had been twenty years before.

Dr. Macdonald, from the chair, thanked Professor Fenner for his interesting paper, and those who had taken part in the discussion.

Congresses.

THE AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE twenty-ninth meeting of the Australian and New Zealand Association for the Advancement of Science was held at Sydney from August 20 to 27, 1952, under the presidency of PROFESSOR SIR DOUGLAS COPLAND, K.B.E., C.M.G., D.Sc., Litt.D., LL.D.

The Sections.

The Sections represented were: A, Astronomy, Mathematics, Physics and Optometry; B, Chemistry; C, Geology; D, Zoology; E, History; F, Anthropology; G, Economics, Statistics and Social Science; H, Engineering and Architecture; I, Medical Science, National Health and Microbiology; J, Education, Psychology and Philosophy; K, Agriculture and Forestry; L, Veterinary Science; M, Botany; H, Physiology and Biochemistry; O, Pharmaceutical Science; P, Geography.

Mueller Memorial Medal.

The Mueller memorial medal for 1952 was awarded to Mr. H. Longman, of Brisbane, for research into palæontology. Mr. Longman was for many years Director of the Queensland Museum.

Reception of Delegates.

The presidential reception was held in the main quadrangle of the University of Sydney on the afternoon of Wednesday, August 20. Guests were received by Sir Douglas and Lady Copland, and by Dr. and Mrs. A. B. Walkom.

University Centenary Receptions.

Representative delegates were entertained at a New South Wales State Government Reception and at a Civic Reception arranged in connexion with the University Centenary celebrations.

Religious Services.

Special church services were held on the morning of Sunday, August 24, at Saint Andrew's Anglican Cathedral and Saint Mary's Roman Catholic Cathedral.

Inaugural Meeting and Presidential Address.

The inaugural meeting was held in the Great Hall of the University of Sydney on Wednesday, August 20. SIR DOUGLAS COPLAND, the President, delivered an address entitled "Authority and Social Control in a Free Society". He said that the Welfare State was faced with the basic conflict between authority and individual initiative and the tendency of control to stifle a life of adventure. The question as to how this conflict could be resolved confronted the social scientist of today. They lived in a totalitarian age when in a moment of crisis they were prepared to enlarge and trust authority in order to defeat those who would wish to impose their authoritarian order upon them. But it would be wrong to assume that controls designed to defend a position could be continued indefinitely to the advantage of the community in other circumstances. That society was permanent which was capable of reconciling the restrictions inherent in social controls with the full and responsible expression of individual enterprise. There was little doubt that the growth of authority and control in free societies had been accompanied by great progress in production, in living standards, in security against many of the hazards of personal life, and in elevation of the status of the individual in the community. Judged by those standards, the state of the free society under the impact of enhanced authority would be regarded as entirely satisfactory. There was, however, by no means universal agreement on that point among the members of the Western community. There were, in the free society, forces of great inherent strength that resisted the advance of authoritarianism in any form. That was the virtue of freedom, that it had the right to resist. But it equally had the opportunity to accept forms of control and the exercise of authority that were agreeable to mass opinion. That was the danger that confronted the free society. Unwilling and unable to work out the functional relationship that reconciled control with enterprise, authority with initiative, it might emphasize those forms of collective action that conferred benefits without the exercise of responsibility. That was best exemplified in the universal quest for security in the modern State. The greatest manifestations of the human spirit, the most notable contributions to civilization and the most enduring societies were not the product of excessive devotion to security.

It would be ethically wrong and economically unsound not to make social provision against certain risks; but where was the dividing line between those forms of security that strengthened the free society and those that exercised a corroding influence?

Sir Douglas Copland asked whether they, as social scientists, were to accept the view that the present degree of authority and control offered a suitable framework in which to preserve the best that the free society could achieve. It was to be hoped that the Congress would be the occasion when, along with the proposed Academy of Science, efforts to establish an Australian Social Science Research Council would succeed, and that both bodies would receive much needed support from governments and move forward to grapple with the many baffling problems that awaited solution and would afford guidance on scientific research in the widest sense of the term.

Public Meetings.

Australia and the Development of Science.

On the evening of August 19, in the Wallace Theatre, University of Sydney, a discussion on "Australia's Responsibility to the Development of Science" was led by PROFESSOR

N. A. BURGES. Professor Burges said that Australia's greatest scientific responsibility was the giving of technical assistance to South-East Asia. Australia must repay to civilization the help it had received in the past. No more important single scientific problem existed than the maintenance of soil fertility in South-East Asia. That was a field in which Australia had a responsibility to carry out intensive scientific work.

David Memorial Lecture.

The fourth David Memorial Lecture was delivered by Professor William Rowan Browne, who chose as his subject "Our Kosciusko Heritage".

The University of Sydney Centenary Oration.

DR. IAN CLUNIES ROSS, Chairman of the Commonwealth Scientific and Industrial Research Organization, who chose as the subject of his Centenary Oration "The Responsibility of Science and the University in the Modern World", paid homage to the courage and vision of the men who, more than 100 years earlier, had established the University of Sydney. It was noteworthy that Wentworth, when moving the Bill for the establishment of the university in 1849, had made no mention of scientists; that was indicative, not only of the lesser place of science at that time, but also of the appreciation which had now been lost—that there was then a unity in knowledge, and that all educated men were expected to have some appreciation of natural philosophy. Indeed, in the only Faculty—that of Arts—one of the three chairs was that of chemistry and experimental philosophy, and the subjects professed were for the first decade or more compulsory for all students of the university.

At the start of the second century of the university they might best give expression to their loyalty, not only by paying tributes to the past, but by a candid and searching scrutiny of any shortcomings which impeded the fulfilment of the university's traditional role of leadership. That self-examination was going on in every country where men believed that from the university and through the higher education it existed to impart must come—if it was to come at all—the knowledge, wisdom and understanding whereby society might learn to weather the storms which beat about it. It was significant that today they seldom thought of university men collectively, as possessed of sound judgement or of a vital system of ideas which united the past and the present in an intelligible whole. They thought rather in terms of special skills and techniques. Ortega saw the modern professional man as the new barbarian, more learned than ever before, but more uncultured. That narrow specialism affected not only the sciences or the professions based on science, but also the humanities, since specialism might as effectively dehumanize the humanities as anything else. That the problem was widely recognized was demonstrated by the views, not only of scholars of the quality of Livingstone, Moberly and Ortega and of committees of the authority of the Harvard Committee, from which had come the report on "General Education in a Free Society", but also of students themselves and of the business world.

They were confronted, then, with the paradox that while science, whether pure or applied, must occupy a more commanding place in the universities, it threatened, by its very nature, to accentuate the movement from broad scholarship towards a fragmented and specialist learning.

The ordinary citizen, ill-equipped as he was to understand the workings of society, found himself, helpless and uncomprehending, in the grip of blind centrifugal forces which hurled him into wars and depressions and threatened to shatter the whole fabric of society. It was no wonder that, confronted with problems, both moral and material, of extraordinary complexity, a government composed of educated but "fragmented" men, or those frankly uneducated, resembled, when subject to the pressures of a "fragmented" society, some tantalized and bewildered beast making short rushes at one obstacle after another until, battered and exhausted, it gave way to another of its kind, though perhaps of a different colour.

Admittedly there were great difficulties in introducing courses of a general nature into already overcrowded curricula. The first need was for the universities to develop a strong conviction about their responsibility. The first responsibility of a university was to make of the ordinary man an educated but enlightened or cultured person, fitted as fully as his natural endowments permitted to be a good member of society. Training for the professions or for any other purpose must be compatible with the satisfaction of the first responsibility. Dr. Clunies Ross described how universities in other countries had tried to solve the problem. He emphasized that action must be taken now. They had not yet experienced the full effects of the scientific age—the age of specialization. They were living on borrowed capital, which was rapidly running out—the capital of an older generation, educated in the tradition of a broader and more liberal scholarship, which still exerted a profound influence on the thoughts and attitudes of their day. Dr. Clunies Ross hoped that, when men gathered to do honour to the University of Sydney a hundred years hence, they would find it grown not only in material power and prestige, but rich in all those qualities that marked a great university.

Combined Meetings of Sections.

Myxomatosis.

A combined meeting of Sections D and I took the form of a symposium on myxomatosis.

F. FENNER (Canberra) discussed "Myxomatosis, the Virus and the Disease it Produces". He said that the elementary bodies of myxoma virus were morphologically indistinguishable from those of vaccinia virus, being roughly rectangular in shape, about 300$\mu\mu$ by 200$\mu\mu$ in the major dimensions, and having a central "nucleus" of greater density than the rest of the particle. A sufficiently large number of characters were shared by myxoma virus and the pox viruses to justify their inclusion within the same genus, but there were no immunological relationships between them. Myxoma virus and the immunologically related fibroma virus were enzootic in certain species of rabbits in South and North America, and both caused benign infections in *Sylvilagus* rabbits. In *Oryctolagus cuniculus*, the European rabbit, myxoma virus caused a disease which was almost invariably fatal, and fibroma virus a completely benign infection. In addition to its extreme lethality for *Oryctolagus cuniculus*, myxoma virus shared with a number of other viruses a high degree of host specificity, infection having been induced only in certain *Sylvilagus* rabbits, in *Oryctolagus*, and in the developing embryos of the chicken and duck.

Professor Fenner went on to say that infection of *Oryctolagus* by intradermal inoculation of a small dose of virus or by mosquito bite was followed by the development of a local lesion three to five days later. Generalization in the blood-stream occurred while the local lesion was developing, and virus could be isolated from the blood and many organs from the third day until death. The first obvious signs of generalization were conjunctivitis and swelling around the anus and genital region, first seen six or seven days after infection. Œdema of the face soon became general and extreme, and death usually occurred at that stage. If the rabbit survived a little longer multiple lumps might appear in the skin all over the body. One virus particle could initiate infection which was almost invariably lethal. *Oryctolagus* could be infected by myxoma virus introduced by any parenteral route, or intranasally, but infection did not follow the ingestion of infected material. Abundant virus was discharged from the conjunctival secretions and nasal discharge of the sick rabbit, but none was found in the urine or fæces. Animals subjected to continued high environmental temperatures (36° to 42° C.) during the incubation period would survive infection with myxoma virus. Study of the serum of Australian wild rabbits which had recovered from naturally acquired infection had shown that both complement-fixing and neutralizing antibodies persisted in demonstrable amounts for at least eighteen months after recovery. Serological surveys of the rabbits remaining in several districts which had suffered Grade I kills during the previous few months had shown that 80% to 90% of the survivors had been infected, and had recovered from the disease. In areas where Grade II kills had been recorded, the percentage of recovered rabbits was lower (10% to 20%), suggesting that the lower death rates were due to less effective transmission rather than to higher natural resistance of the rabbits.

Professor Fenner then said that two laboratory variants of myxoma virus were known which caused milder disease, with mortality rates of 15% and 30% respectively. No evidence had been forthcoming yet that any mutant strain of diminished virulence had developed in wild rabbits in Australia. Possible courses in the evolution of the host-parasite relationship included maintenance of the present high lethality, or the development of a lowered killing power due to genetic changes in the virus or in the rabbit population, or in both.

M. F. DAY (Canberra) described the transmission of myxomatosis by insects. He said that although myxomatosis could be spread by contact, insects were mainly responsible for transmission of the disease in the field. Early work had demonstrated that fleas and several species of mosquitoes could all act as vectors in the laboratory. The Commonwealth Scientific and Industrial Research Organization

Division of Entomology and the Department of Microbiology of the Australian National University had collaborated in obtaining a clearer picture of the mechanism of transmission by the mosquito *Aëdes ægypti*. It had been shown that virus ingested with the blood was incapable of causing infections when the mosquito bit subsequently. A mosquito became infective only when it penetrated a skin lesion so that the mouth parts became contaminated with virus. There was no latent period, and mosquitoes could transmit the virus by interrupted feedings. The probability of a mosquito's becoming infective increased with the age of the lesion. It was negligible until the fifth day of the disease and reached a maximum at the death of the rabbit. The probability of an infective mosquito's transmitting the disease was inversely proportional to the logarithm of the time after infection. One mosquito had transmitted infection twenty-nine days after the infective feed. Negative results might intervene between positive transmissions. Pins stuck into skin lesions transmitted the disease in a similar way to mosquitoes. One pin infected six rabbits on subsequent days, and one transmitted infection twelve days after it had been infected. Pins stuck into skin distant from a lesion never transmitted the disease. Infective virus had been found in mosquito excreta and the gut, but not in other parts of the body. Transovarial infection did not occur.

Transmission of myxomatosis by *Aëdes ægypti* was therefore purely mechanical and thus it differed from the majority of mosquito-borne diseases. Other arthropods probably transmitted infection mechanically also, and that suggested that any arthropod that punctured the skin of the rabbit could function as a vector. This was substantiated by the work of the Commonwealth Scientific and Industrial Research Organization Wildlife Survey Section, which had shown that the rabbit louse and parasitic mites could also transmit the disease in the laboratory. On the other hand, there was no evidence that bush flies were efficient vectors. The relative efficiency of arthropod vectors in the field would depend upon their longevity, flight range *et cetera*, but particularly upon the frequency with which they fed upon rabbits.

K. MYERS (Canberra) spoke of vector ecology and its relation to myxomatosis performance in the field. He said that the epizootic of myxomatosis in rabbits which broke out in December, 1950, in the Corowa area of the eastern Riverina, indicated for the first time the presence in Australia of an efficient mobile vector of the disease. Experiments carried out previously by the Wildlife Section of the Commonwealth Scientific and Industrial Research Organization had confirmed and added to earlier work, in showing that despite high population densities, low rates of predation of diseased animals and the continued contact between sick and healthy rabbits, in the absence of an effective vector no epizootic could be expected to occur. By mid-February, 1951, the area embraced by the epizootic measured 1000 miles from north to south and 1100 miles from east to west, the most notable performance of the disease occurring along the waters of the Murray-Darling river system. A study of the mosquito *Culex annulirostris*, with its habits of breeding in the river-flat lagoons and feeding on river-frontage rabbit populations, soon yielded evidence on its value as a vector and added to the understanding of the incidence and distribution of the disease. The virus persisted in the field during the winter of 1951, apparently owing to the activities of ectoparasites (mites and lice). From the nuclei resulting from this over-wintering and from later introductions by State departments, a further epizootic developed towards the end of 1951. The seasonal succession of mosquito species in the eastern Riverina was found to be closely related to the seasonal incidence of the disease. At Lake Urana, about 70 miles north-west of Albury, the commencement of the epizootic synchronized with the onset of activity of *Anopheles annulipes* in early summer. The inefficiency of the spring *Aëdes* species, which fed chiefly on stock during the day, was strongly contrasted with the efficiency, as vectors, of *Anopheles annulipes* and *Culex annulirostris*, summer mosquitoes which fed at night on rabbits. Sand-flies or black-flies of the family Simuliidæ also played important parts in some localized epizootics near the larger rivers, their value as vectors depending upon feeding preferences and population size.

Mr. Meyers went on to say that the general incidence and distribution of the disease during the 1951-1952 epizootic throughout the whole region surveyed—from the western districts of Victoria and south-east South Australia northwards to the Lachlan River in New South Wales and eastwards to the southern tablelands of the Great Dividing Range—could be correlated with the picture seen in the eastern Riverina, *Anopheles annulipes* being the one vector species common throughout. Initial attempts at analysing the whole field picture had made clear the two aspects to be considered—the local and the regional. Locally, disease incidence could be correlated with the seasonal succession of vector species within any habitat. Differences in disease performance of another order occurred over whole regions, however, owing in the main to basic differences in climate and its effect on insect life in general.

Zoology and Medicine.

I. M. MACKERRAS (Brisbane), in his presidential address to Section D, said that the relationship between zoology and medicine was so close that it might properly be termed a symbiosis. It began with entry of the medical student into the university, when the primary aim should be to give him a broad biological foundation which would leaven the whole of his future professional outlook. An important subsidiary aim was to introduce him to technical skills which would help him in later life, but the teaching of applied "medical zoology" at that stage was strongly deprecated. It was a defect in the later stages of medical education that an appreciation of the plasticity and variability of biological material was frequently lacking in medical practitioners, with the result that they were often uncritical of their observations, whether of the course of a disease or of the results of treatment. Something of the rigid discipline of statistical analysis, which was nowadays part of the normal equipment of the economic biologist, would be useful in general medicine, too. On the other hand, medical workers in the past had been greatly impressed with the observable effects of repeated stimulation, with use hypertrophy, and conversely with disuse atrophy, and that had led some of them to distinctly Lamarckian views. Most of their theses had vanished, but one remained long unanswerable. There was no doubt that formation of antibody by cells of the lymphoid-macrophage system was an acquired characteristic; and there was no doubt that the capacity to form antibody was transmitted to the descendants of the originally stimulated cells. There had been no recent suggestion that gene-modification was involved, and it had been only with the new knowledge of adaptive enzymes and cytoplasmic inheritance that a logical explanation consistent with modern genetics could be put forward by Burnet and Fenner.

Another field in which there was a close fundamental relationship between zoology and medicine was the study of infectious disease. There the words "epidemiology" and "ecology" were now synonomous terms; and the medical administrator, dealing with direct practical problems of prevention, was as much concerned with host-parasite relationships, modes of dispersal, population densities, and the factors which influenced all three, as was the pure zoologist in his study of animal associations in the field. Finally, in the restricted specialty of medical zoology, the two branches of knowledge became one. Nobody would now question the practical value of pure natural history studies of the feeding habits and resting places of adult mosquitoes, and there were many other fascinating problems awaiting attention. One, which was of particular interest in Queensland, was a precise determination of the animal reservoirs of certain infections, and a detailed study of their ecology. Encephalitis and leptospirosis were important examples. It might be hoped that intensive work on those lines would be developed in the near future.

Virulence and Infectivity of Microorganisms.

In his presidential address to Section I, E. V. KEOGH (Melbourne) said that the terms "virulent" and "infective" had meanings and implications which varied according to the context in which they were employed. Either might be used as descriptive of a disease, or in reference to an attribute, or attributes, real or conjectural, of an agent causing disease. Confusion of thought arose because the terms had dual meanings and because there was no unanimity of opinion in respect of their definitions. It was not possible to provide single definitions of those terms applicable to the various circumstances in which they were employed. But if the terms of reference were stated, satisfactory definitions could be found. A virulent infection might be defined as one which gave rise to severe infections in contacts; but it was obvious that the severity of the infection depended not only on the nature but on the dosage of the infecting agent and also on the host. It was now accepted that the term "virulence", as applied to an infectious agent, had no precise meaning unless the host infected and the mode of infection were specified. The same conditions were applicable to the term "infectivity". Virulence and infectivity were independent properties; a non-virulent infection might be very infective. Provided that it was also specified whether either term was used with reference to the

disease process or to the infecting microorganism, satisfactory definitions could be developed for both sets of circumstances. To handle problems one must talk in symbols; and when symbols were used, some of the evidence was suppressed. Dr. Keogh went on to describe a notation which facilitated quantitative assessment of those properties and its application to the study of communicable diseases. He said that it was possible to measure infectivity in terms of the total number of infected particles; that, however, was only the potential infectivity. Alterations in the environment might affect the dose that reached the target and therefore the severity of the resulting infection. For instance, the severity of an attack of typhoid fever depended, not only on the strain of the infecting organism, but also on the dose received. The ratio of environmental dosage (E.D.) to the dosage received (R.D.) might be called the environmental factor. A "dose factor" might be involved in the modern change in infant and child mortality. It used to be thought that cyclic changes occurred in the virulence and infectivity of microorganisms. That had not been disproved, but was now thought to be a superfluous assumption, as the observed phenomena could be due to changes in the environmental factor. The dosage of an infection was influenced by the ratio of the number of infecting animals to "infectees". In any system of measurements of virulence and infectivity there must be a complete over-simplification, as it was impossible to assess all the factors concerned. It would be better not to use the term "virulence" in scientific literature. Oliver Wendell Holmes had used the term "polarized" of words and ideas. That term meant prolonged rest in a fixed position; it was sometimes necessary to "depolarize" a fixed idea. Virulence, as the term was used, was not always a clear-cut property. Some so-called non-virulent strains had produced infections indistinguishable from those known to be caused by virulent strains.

Public Health.

Fluorine and Dental Caries.

N. E. GOLDSWORTHY (Sydney), in a paper read before Section I, discussed the advantages and disadvantages of the use of fluorine in relation to dental caries. He said that fluoridation of domestic water supplies for the partial control of dental decay had been described as the most important discovery in public health practice in the last twenty-five years. At the beginning of the twentieth century a disease of the teeth now known as mottled enamel or chronic endemic dental fluorosis had been recognized in certain geographical areas of Italy, North Africa and the United States of America. It was linked with the use, from birth onwards, of the water supply in those areas. After initial reports that mottled teeth did not necessarily show more dental caries than did teeth not so affected, it had been proved that the presence of fluorine in domestic water supplies, through natural agencies, was associated with a considerably lower incidence of caries. There was ample evidence in support of the harmlessness, efficiency and practicability of the use of fluoridated domestic water supplies. The occurrence in uncontrolled circumstances of toxic manifestations was no reason for denying the benefits of fluorine to very large numbers of urban people, where engineers and chemists could see to it that the fluorine content of the water supply was maintained at a level below that which could cause any of the recognized injuries. The principal advantages of the practice were the ease of application of the measure to the whole population in a rigidly controlled manner, the low cost, and the fact that there was no need for the active cooperation of the population. The alleged disadvantages of the practice had no substantial factual support. An alternative method of administering the fluoride—namely, by topical application to the erupted teeth—was briefly discussed, as also were the advantages and disadvantages of that procedure. The mode of action of the fluoride was still uncertain, but was apparently different for the two methods of administration. The two most commonly held views were that the incorporation of fluoride into the enamel, whether through its thickness (fluoridated water) or in the surface layers only (topical application), rendered the enamel physically harder and chemically less soluble in the presence of hydrogen ions, or limited the acidogenic activities of microorganisms by virtue of the enzyme-inhibiting properties of the fluoride ions. Dr. Goldsworthy referred to the apparent lack of interest among medical and dental circles in Australia in those preventive measures. A survey had been carried out in New South Wales, but no water containing substantial natural supplies of fluorine had been found. Dr. Goldsworthy urged that experiments with water supplies should be undertaken throughout Australia, but that a caries survey should be linked with them in order to gauge the effects of the experiments.

Hæmoglobin Values in New South Wales.

R. J. WALSH (Sydney), speaking before Section I, said that a survey of the hæmoglobin values of 4065 adults and 5070 infants and children had been undertaken with a standardized hæmoglobinometer. The mean value of male adults was found to be 15·71 grammes *per centum*, and that of females 13·89 grammes *per centum*. A significant decrease was observed in both sexes in the later years of life, but only a slight increase occurred in the female values after the menopause. Pronounced hæmodilution was observed during pregnancy and was apparent in the first trimester. The high hæmoglobin value of capillary blood of newborn infants rapidly decreased, and the value at three months was the lowest recorded during life. Little change occurred before twelve months of age, but thereafter a gradual rise was observed. The onset of puberty was associated with an increase of the value of males to the adult levels. Sex differences were not seen before puberty. The mean values at all ages compared favourably with those reported from other countries.

Public Health Aspects of the Rh Factor.

Dr. Walsh also discussed public health aspects of the Rh factor. He said that neonatal disease produced by the incompatibility of the parents' Rh blood groups occurred once in approximately 200 births. Both the frequency and the mortality increased with succeeding pregnancies of Rh-negative women. The social implications of these facts were discussed. Many affected infants surviving the neonatal period exhibited evidence of cerebral damage, but as a cause of infantile cerebral palsy the Rh factor was not nearly so frequent as was birth injury. To date it had not been possible to prevent the occurrence of hæmolytic disease in the Rh-positive child of an immunized mother, but therapy had reduced the mortality and the frequency of complications.

Yaws and its Transmission.

M. J. MARPLES (Dunedin), speaking at a meeting of Section I, discussed the transmission of yaws by flies, and described a series of observations and experiments carried out in Samoa.

Epidemiological and Serological Studies of Poliomyelitis and Coxsackie Viruses in New South Wales.

N. F. STANLEY (Sydney), also at a meeting of Section I, gave a brief account of the occurrence of different groups of Coxsackie viruses in New South Wales and their possible relationship to poliomyelitis, Bornholm disease, encephalitis and herpangina. The method of isolating and identifying Coxsackie viruses was described, together with some of their properties.

The Pathogenicity of Mycobacterium Ulcerans.

R. H. LEACH AND F. FENNER (Canberra) presented work on the pathogenicity of *Mycobacterium ulcerans*. It was pointed out that during the last five years two new species of *Mycobacterium* had been described, both of which caused chronic ulceration of the skin in man. They were *Mycobacterium ulcerans* in Australia and *Mycobacterium balnei* in Sweden. A feature of both was their temperature requirement for optimum growth, which was about 31° to 33° C. Both grew very slowly or failed to grow at all at 37° C. Experiments in mice and chick embryos showed that in all probability the pathogenic behaviour of both those species was dependent upon the temperature requirements. In chick embryos growth occurred after intravenous inoculation if the eggs were incubated at 33° C., but not if they were incubated at 37° C. In mice the pathogenic picture could similarly be related to body temperature.

The Epidemiology of Deafness due to Maternal Rubella.

H. O. LANCASTER (Sydney) said that he had tried to determine the world-wide incidence of epidemics of deafness by the examination of census and institutional data, for, although questions on deafness had been asked in many censuses, very little of epidemiological interest had been obtained. Deaf-mutism in the European censuses had evidently been largely deaf-mutism due to cretinism. Only the Australian censuses had been of value, because in Australia there was not such a large population of cretins as existed in Austria, the old Russian provinces *et cetera*. The epidemics of measles and of rubella were much more widely spaced in Australia and New Zealand than in England, and so it was easier for a female to attain the child-bearing age without having suffered from rubella in such isolated areas as Australasia and Iceland than in such populous areas as North America or England or continental Europe. In such

large population aggregates measles and rubella probably were endemic every year. In Australia, New Zealand and Iceland it was easy for rubella to die out completely. Sweden, United States of America, England and Italy had all failed to show any dramatic epidemiological features. Iceland, Australia and New Zealand were all prone to epidemics, but in the nature of things such epidemics could not be repeated except after considerable intervals. In Australasia conditions were probably aggravated in wartime by women continuing to work in armed forces and in commerce whilst pregnant.

Escherichia Coli "O" III and Infantile Gastro-Enteritis in Brisbane.

C. S. LUDFORD (Brisbane) discussed the history of *Escherichia coli* "O" III and its association in certain cases of non-specific infective gastro-enteritis. *Escherichia coli* serological grouping had been commenced in Brisbane with the use of sera against 26 "O" groups established by Kaufmann. Regular examination of infants in welfare homes was preferred to that of children in hospital in the hope of obtaining more epidemiological material. In those examinations *Escherichia coli* "O" III was isolated in a number of cases from children not showing symptoms of gastro-enteritis. After an outbreak of gastro-enteritis in a child welfare home, *Escherichia coli* "O" III was isolated from four of five initial cases. The organism was associated with the spread of infection which followed. In an examination of the staff, two out of 45 were shown to be excreting the organism. Transmission of the organism was discussed.

Epidemiological Aspects of Malaria in Some Polynesian Islands of the Solomons Group.

R. H. BLACK (Sydney) discussed the results of a malaria survey of the "Polynesian" islands—Ontong Java, Sikaiana, Rennell and Bellona—in the British Solomons Islands Protectorate carried out in the period May-June, 1952.

Plant and Animal Viruses.

At a symposium on viruses held by Section I, a discussion on virus-host interaction was opened by R. J. BEST (Adelaide). The discussion was followed by a series of papers on various aspects of virus infection in plants, in animals and in man. Only those concerned with human infections are mentioned here.

The Nature of a New Group of Coxsackie Viruses.

N. F. STANLEY discussed the properties of a hitherto undescribed group of Coxsackie viruses, provisionally designated Group C, and associated with an explosive outbreak of encephalitis in Sydney. A brief description of the viruses falling into Groups A and B was presented for comparison. The value of the suckling mouse in studying the pathogenesis was stressed.

The Nature of the Complement-Fixing Antigen of Influenza Virus.

G. L. ADA AND BEVERLEY PERRY (Melbourne) presented work on the complement-fixing antigen of influenza virus. It was pointed out that one of the most important phenomena associated with infection by influenza viruses was the production of a "soluble" antigen which, when mixed with specific convalescent serum, would fix complement. It was basic for an understanding of virus reproduction in the cell to determine if possible the chemical nature of the antigen. Hoyle in a recent symposium had concluded that the antigen was a nucleoprotein of the ribose type. An exact chemical analysis involved as a preliminary step the purification of the antigen. Extracts of lungs from embryo chicks previously inoculated with virus had served as sources of the antigen. Partial purification had been effected by solvent fractionation or differential centrifugation in an ultracentrifuge. Isolation of the antigen from those preparations had been achieved by precipitation with the specific antibody, and such precipitates had been subjected to an analysis for nucleic acid content.

The Nature of Passive Immunity in Influenza.

S. EAZEKAS DE ST. GROTH (Canberra) said that only that fraction of antibody was immunologically active—capable of preventing infection—which met and neutralized the virus before it could enter a susceptible cell. In mice that represented only one in 300 of homologous antiserum administered parenterally. With heterologous antibody the distribution between the circulation and the respiratory tract was even less favourable, approximately one in 2000. That seemed to be due to a selective permeability of the lungs for homologous antibody. By intranasal instillation of certain mild irritants (pathotopic adjuvants) the relative concentration of antibody in the bronchial lumen could be increased by a factor of 5-20, with a corresponding rise in resistance to experimental influenza infection. Pathotopic potentiation of passive immunity was equally effective with homologous and heterologous antisera.

Host-Parasite Relationships in Ectromelia Infections.

P. M. DE BURGH (Sydney) said that one of the difficulties in studying the growth of a mammalian virus in its natural host was the uncertainty about the duration and extent of infection. By injecting large doses of ectromelia virus intravenously into mice, it was possible to infect a good proportion of liver cells within a short time. The remainder of the liver cells were infected about eight hours later by virus liberated from the initial infection. That system had been used to study the relation between multiplication changes in liver cells and symptoms. The virus titre in the liver, after an initial rapid fall, increased about a hundred-fold between five and fifteen hours. The first sign of altered function was not found until fourteen hours, when the initially infected cells lost the ability to form glycogen. The earliest changes in composition occurred at about eighteen hours and increased to about twenty-four hours, when the first signs of structural damage appeared. The amount of new material formed by the liver was far greater than the weight of virus. The intracellular site of production of new material was being investigated.

The Physiology of Microorganisms.

Before Section I a series of papers on the physiology of microorganisms was read.

The Metabolism of Carbohydrates by the Organism of Contagious Bovine Pleuropneumonia (Asterococcus Mycoides).

A. W. RODWELL AND E. S. RODWELL (Melbourne) presented work on the metabolism of carbohydrates by the organism of bovine pleuropneumonia. It was pointed out that the extreme pleomorphism, small size, and multiple modes of reproduction distinguished the so-called "pleuropneumonia-like" organisms from ordinary forms of bacteria, and related them rather to the "L" forms. Too little was at present known, however, about the metabolism of these organisms to clarify their relationships. A beginning had been made with a study of the metabolism of the organism of bovine pleuropneumonia. The picture which was beginning to take shape was that of a comparatively simplified form of metabolism. Although the nutritional requirements had not yet been defined, the indications were that they were complex, and that the organism had comparatively limited synthetic abilities. The medium for the growth of the cell material used in these studies was based on a pig's stomach digest of ox liver, buffered at pH 7·5 with phosphate and containing animal serum, the complete medium being sterilized by Seitz filtration. In this medium carbon dioxide tensions greater than atmospheric had been shown to exert a pronounced growth-stimulating effect. The organism was an obligate aerobe. The following substrates were not attacked by intact or disrupted cells: formate, acetate, malate, fumarate, succinate, citrate, glutamate, aspartate, proline or alanine. It therefore seemed highly unlikely that the organism possessed a dicarboxylic or tricarboxylic cycle. Glucose, lactate and pyruvate were oxidized exclusively by cell suspensions to acetate, carbon dioxide and water. Anaerobically, cell suspensions catalysed the dismutation of pyruvate to lactate, acetate and carbon dioxide with the concomitant formation of small amounts of acetoin. The possibility that a-acetolactate might be an intermediate in the pyruvate dismutation reaction, and in pyruvate oxidation, as well as in acetoin formation, was investigated. In confirmation of Juni's recent findings with *Aerobacter aerogenes*, no evidence supporting the intermediate formation of a-acetolactate was involved. Glucose was not fermented anaerobically by cell suspensions of the organism, and thus appeared to be broken down exclusively by an oxidative pathway.

Sulphydryls in Culture Media.

V. B. D. SKERMAN (Brisbane), discussing sulphydryls in culture media, said that Brewer's medium and liquid thioglycollate medium dispensed in seven centimetre depths in unsealed vessels failed to support the growth of *Clostridium perfringens* beyond 100 hours. The liquid thioglycollate medium would still support a growth of *Clostridium perfringens* for a considerable period after it had turned pink. Media compounded from the constituents of Brewer's medium indicated the following: (i) that agar had no

influence on the rate of oxidation of thioglycollic acid and cysteine, but did promote the growth of *Clostridium perfringens* for a limited period (forty-eight to ninety-six hours longer than controls); (ii) that the removal of oxygen from these media by boiling was not the true reason for the subsequent usefulness of the oxidized media. This was due to the regeneration of sulphydryls. It had been noted that cystine gave rise to a considerable amount of cysteine when refluxed in phosphate buffer at pH 7·0 and in glass-distilled water. A considerable amount of sulphydryl compound, probably cysteine, was liberated during the refluxing of liver, pork and veal. Only a small amount was liberated from heart muscle. It had been demonstrated that *Clostridium perfringens* could be grown in yeast extract peptone water to which sulphydryl in amounts insufficient to remove more than 20% of the oxygen had been added. During growth in such medium the pH did not fall below +0·18 volt. The growth of the organism was merely dependent on the presence of a small trace of a reducing agent capable of activating sulphydryl enzymes, and was independent of oxygen and potentials except in so far as the latter influenced the existence of and reflected the measurement of the reducing agent respectively.

Chromatoid Bodies, with Special Reference to the Cysts of Entamœba Histolytica.

T. C. BACKHOUSE (Sydney) presented some observations on the staining reactions of the basophilic bodies which were conspicuous at certain stages in the development of the cysts of *Entamœba histolytica*. Brief reference was made to the views of various writers concerning the nature and function of these and similar cytoplasmic inclusions. They had been given many different descriptive names, but MacLennan (1941) recommended that those names should all be discarded in favour of the general collective term "protein reserves" pending their further chemical identification. In the present observations the chromatoids of *Entamœba histolytica* cysts fixed with Schaudinn's solution and stained with methyl-green-pyronin showed a considerable affinity for the pyronin element. In one experiment treatment with ribonuclease prior to staining appeared to remove the pyronin staining material from the cysts, but there was some doubt as to whether the enzyme used was entirely free from proteolytic activity. Further experiments with the use of an orange-G-methyl-green-toluidine blue staining procedure before and after treatment of the cysts with ribonuclease and perchloric acid respectively, gave confusing results. That was possibly because cysts were used that had been stored in 70% alcohol for a long period. Adequate supplies of fresh cysts had not become available. The suggestion that the chromatoid bodies were composed of or contained ribose nucleic acid was linked with the possibility of their being related to the maturation of the cyst in its development from the uninucleate to the quadrinucleate condition.

Ecology of Microorganisms.

A series of papers under the general heading of "Ecology of Microorganisms" was read before Section I.

Heterotrophic Bacteria in a Marine Environment.

D. E. J. FERGUSON WOOD (Sydney), discussing heterotrophic bacteria in a marine environment, said that the genera and species of marine bacteria resembled those commonly found in soil, except that *Clostridium* and other true anaerobes seemed to be absent. That was true only of species in the sense of Lehmann and Neumann, and not in the sense of Bergey's "Manual of Determinative Bacteriology", which was largely useless for marine bacterial forms. Marine bacteria, like soil and fresh-water bacteria, were exceedingly variable in morphology and physiology, the biochemical reactions being of little use in classification. Most bacteria in marine environments were absorbed on particles (up to 99·8%), and it seemed that this greatly increased their activity. There was evidence of the presence of very stable enzymes which could exist independently of the bacteria. The difference between heterotrophs and autotrophs was not pronounced, most forms being facultative in that regard.

Use of Fluorescence Microscopy in the Study of Soil Microorganisms and of Their Ecology.

Y. T. TCHAN (Sydney) proposed a fluorescence microscopic technique for the examination of soil microorganisms. He said that the method was rapid and accurate, and eliminated the selective errors of culture techniques. The technique had been used to investigate some ecological aspects of soil microorganisms, the daily variation in their numbers, the influence of water content of the soil, the effects of bush fires, and the influence of mineral elements.

Industrial Applications of Microbiology.

In addition to the papers mentioned above, a series of papers on the industrial applications of microbiology was presented by various speakers, and a series of excursions was arranged to industrial establishments where large-scale fermentations could be observed.

The Teaching of Microbiology in Australia.

At a meeting of Section I a discussion on the teaching of microbiology in Australia was opened by S. D. RUBBO (Melbourne). Professor Rubbo said that he was not competent to speak on the teaching of microbiology throughout Australia, and that his opinions were necessarily coloured by his experience in Melbourne. He would deal first with the teaching of biological sciences at a university and then with the teaching of microbiology in particular. The traditional technique of university teaching was the lecture system; that was the keynote, though it was bracketed with practical classes. For a variety of reasons, the lecture was an inefficient way of teaching. Time and time again one realized the inefficiency of the lecturer himself; sometimes it could be overcome, sometimes not. Listening to lectures was not a good way of learning. Individual students learnt and wrote at varying rates. Sometimes the material of the lecture did not pass through the mind of either lecturer or student; sometimes it passed only through the lecturer's mind. If the purpose of the lecture was to supply information, that might be teaching; it was not education. It was a problem as to how the lecture system might be used to inculcate some sort of attitude; to do that was a most important part of the teaching of any subject at a university. The first duty was to create an educational atmosphere. The examination system marred the teaching of all subjects in the faculties of science and medicine. There were two ways of teaching—the didactic method and the heuristic method. It was impossible to supplant the lecture system at present. If the classes were smaller the tutorial system could be adopted; that might present a chance to practise the Socratic method. Practical classes afforded an opportunity to present a problem for solution and thus make students begin to think.

Coming to the special problem of the teaching of microbiology, Professor Rubbo said that the main interest was how to teach in order to produce microbiologists, and secondly, how to contribute to the professional training of doctors and others. In his opinion, microbiology should be a post-graduate subject, following on the acquisition of basic knowledge and techniques before graduation. An institution might, for instance, appoint a chemist to be trained later in microbiology if his interests lay that way and if the institution required such work. At present there was not the accommodation for post-graduate students. Facing the reality of an undergraduate course one encountered various dilemmas concerned with an expanding amount of knowledge and a limited time in which to teach it. Should the course be designed to fit the desires of prospective employees or the requirements of an expanding science, what should be the prerequisites? In Melbourne the student was required to have completed a second year in chemistry. One should try to integrate a course in biochemistry. That had been attempted in Melbourne. Professor Rubbo said that in his experience there was a great wastage of students trained in microbiology; most were females and were soon lost to microbiology by marriage. He would estimate that the average effective scientific life was two and a half years. If a post-graduate course, with employers supplying the students, was substituted for an undergraduate course, there should be less wastage. Professor Rubbo said that he was not interested in what employers required. He did not intend to produce personnel for hospital laboratories, nor could he train students for research except in so far as one could bring out inherent ability. In the designing of a course the emphasis should be on fundamental aspects, not on practical applications. Professor Rubbo gave the details of the course in microbiology as taught in Melbourne at present. In regard to the training of students of agriculture, medicine and dentistry, and of nurses and technicians, Professor Rubbo thought that the university should try to meet the requirements of the professions concerned. It must always be remembered that the true aim of university teaching was to inculcate an appreciation of methods, and not to supply a collection of facts.

R. J. BEST (Adelaide) agreed that all courses in microbiology except those which formed part of professional training should be at a post-graduate level.

D. F. GRAY (Melbourne) said that the ideal could not be achieved at an undergraduate level because of pressure on the students. The best that could be done was to inculcate basic ideas and techniques. Professor Gray thought that visual aids should be used much more than at present.

P. M. NOSSAL (Adelaide) said that as a biochemist attempting to tackle a microbiological problem, he felt his lack of training. He thought that most courses in bacteriology showed a bias towards systematics. He referred to a post-graduate course in microbiology at the University of Sheffield. This lasted two years and was limited to eight students, most of whom were sent by the organizations by whom they were employed. That was probably the sort of thing which Professor Rubbo had in mind. Dr. Nossal thought that if the course was to be an undergraduate one, students should not take it before their third year and there should be strict prerequisites.

Dr. Best asked what were the prerequisites that Dr. Nossal had in mind.

Dr. Nossal said that he was not prepared to say, but there seemed to be a need for the study of bacteriology from a biochemical aspect. Had anybody said just what a microbiologist was? How did a microbiologist differ from a bacteriologist on the one hand and a biologist on the other?

Professor Rubbo said that that was a difficult question to answer. His own department in Melbourne should be called the department of microbiology rather than the department of bacteriology.

ROSE MUSHIN (Melbourne) said that there were two limiting factors to university courses. One was the absorption capacity of the student, the other was the examination system. A change in the examination system might facilitate an improvement in university teaching.

V. B. D. SKERMAN (Brisbane) referred to the teaching of microbiology in the University of Queensland, where there were, in addition to the four professional courses, four courses in bacteriology for science students. One of them was an honours course, of four years' duration, taken in conjunction with a three years' course in chemistry. In the pure science courses the emphasis was on general bacteriology rather than on systematics.

K. FARRAR (Melbourne) thought that Professor Rubbo had stated a very sound principle when he said that students should be trained primarily in the fundamental sciences. The basic discipline was that of chemistry. Thorough grounding in mathematics and physics would be useful, but time was a limiting factor. He agreed that microbiological training should be at a post-graduate level, but he asked who was going to stand the economic strain. Industry in Australia had not yet reached the stage when it could afford to send graduate employees away for prolonged special training, nor could the hospitals afford to do so. Post-graduate courses on a part-time basis might help to solve the problem. Mr. Farrar thought that two things were lacking in the training of science students at present; one was that they failed to use the literature to the best advantage, the other was that they knew little or nothing about media making.

Dr. Best thought that a study of fungi and of viruses should certainly be included in a course of microbiology—not to satisfy prospective employers, but to teach different methods of approach. He agreed that students had little time to learn to use the literature. It was not practicable to teach students how to make media in an undergraduate course; in a post-graduate course it would be practicable.

F. H. REUTER (Sydney) referred to bacteriology in connexion with food poisoning. Professor Reuter said that the man who wished to teach the fundamentals of food processing must spend a lot of time on microbiology. It was difficult to separate the theoretical from the practical aspects. There were people engaged in food processing whose whole life was a fight with microorganisms. Persons who had come to know a lot about the industry might wish to go back and learn a lot more about microbiology. A long, full-time course would not be practicable; a series of "short schools" would be more useful.

PHYLLIS ROUNTREE (Sydney) said that one of the problems mentioned was the problem of large numbers. She asked whether the unexpandable timetable could be expanded by not giving lectures, and by handing out notes and forming discussion groups. That might not be practicable, but it could at least be tried.

The Metabolism of the Sugar Alcohols.

In his presidential address to Section N, N. L. EDSON (Dunedin) discussed the metabolism of the sugar alcohols. Professor Edson said that the discovery of the sugar alcohols had played an important part in the development of carbohydrate chemistry during the nineteenth century, but the biological significance of those substances had remained obscure. The process of formation of polyols in plants, fungi and bacteria was largely unknown, and the mechanism of the acid fermentation commonly exploited by bacteriologists for taxonomic purposes had not been unravelled. Only in the case of *Acetobacter* was there any considerable body of knowledge regarding the degradation of polyols, but there, too, the enzymatic machinery was unknown. Although several of the polyols appeared to have functions in the animal economy, physiologists had confined their attention chiefly to inositol and sorbitol. The latter was often present in edible fruits of the Rosaceæ. Embden and Griesbach in 1914 had found that sorbitol was transformed into glucose and fructose by perfused liver of the starved and phlorrhizinized dog. Despite this unequivocal demonstration, the introduction of sorbitol into therapeutics was followed by a controversy in which the ability of animals to metabolize sorbitol was questioned. The bulk of the evidence emerging from polemics favoured the conclusion that sorbitol was convertible into liver glycogen and blood sugar. Sorbitol also inhibited the endogenous ketone-body formation which occurred in liver slices of fasted rats. During an investigation of that antiketogenic action Blakley in 1951 had isolated the enzyme responsible for the first step in sorbitol metabolism. That enzyme, present in the non-particulate fraction of rat liver homogenates, probably occurred in liver and kidney of most mammals, but not in muscle or other organs. It was proposed to call the enzyme L-iditol dehydrogenase.

Professor Edson said that the specificity of the enzyme system which must exist in the cells of *Acetobacter* was different. The selective oxidation of polyols by *Acetobacter xylinum* was discovered by Bertrand (1898), whose observations were generalized in a well-known rule. As the result of a comprehensive study of the oxidation of polyols and w-desoxypolyols by cultures of *Acetobacter suboxidans*, C. S. Hudson and his colleagues (1938-1950) had confirmed and extended Bertrand's rule. It was clear that the liver enzyme did not conform to the Bertrand-Hudson rule. Indeed, the difference was well illustrated by the reactions of the common hexitols. Sorbitol was oxidized to fructose by mammalian liver, whereas it was oxidized to sorbose by *Acetobacter*; and mannitol, which was oxidized to fructose by *Acetobacter*, was not attacked by the liver enzyme. Soluble enzymes oxidizing mannitol and sorbitol in the presence of DPN had been extracted from the berries of *Sorbus aucuparia* and from *Torulopsis utilis*, *Mycobacterium phlei* and an unidentified coliform bacillus. It was probable that both *Acetobacter* and the cell-free preparations contained an enzyme, the appropriate name for which was D-mannitol dehydrogenase. Neither of the foregoing dehydrogenases would attack dulcitol (mesogalactitol); yet dulcitol occurred in plants and microorganisms and was fermented by certain bacteria. It was possible that there was a third specific type of polyol dehydrogenase which might be termed mesogalactitol dehydrogenase. If the existence of those three type-specific dehydrogenases was assumed, it was possible to indulge in speculations which attributed the natural occurrence of polyols (alone or in company with their corresponding ketoses) to reversible coenzyme-linked dehydrogenations. The hypotheses would also explain the formation of mannitol by moulds and "mannite bacteria" and the behaviour of the hexitols in the animal body.

Porphyrins from Heart Muscle.

R. LEMBERG (Sydney) described at a meeting of Section N a new method for the preparation of porphyrin *a*, the iron-free prosthetic group of cytochrome *a* and cytochrome oxidase from ox heart muscle, with a yield of five to ten milligrammes per kilogram of wet muscle. Porphyrin *a* was separated from protoporphyrin and small amounts of a second formylporphyrin, identical with Negelein's "cryptoporphyrin", by extracting protoporphyrin from ether by 3% hydrochloric acid, cryptoporphyrin by 8% hydrochloric acid and porphyrin *a* by 25% hydrochloric acid. Porphyrin *a* was obtained in microcrystalline form by precipitation from chloroform with light petroleum; its purity was checked by quantitative spectrophotometry. The results, which were compared with those of Warburg and of Granick, showed that the molecule was far larger than that of protoporphyrin, and that it probably contained a long fatty acid side chain, in addition to a formyl group and an unsaturated side chain. It did not contain the isocyclic ring of chlorophyll, nor its phytol ester group.

Factors Affecting Fat Mobilization.

An address on "Factors Affecting Fat Mobilization" was given before Section N by PROFESSOR C. H. BEST, of the University of Toronto, Canada.

Physiological Variations of the Hæmoglobin Concentration.

R. J. WALSH (Sydney) described to Section N various experiments he had performed in order to assess the physiological variations of the hæmoglobin concentration. As a preliminary step, the standard error of measurement of the hæmoglobin concentration had been determined. Pronounced fluctuations in the hæmoglobin concentrations of individuals had been observed from day to day, but the reported premenstrual hydræmia had not produced consistent alterations of the hæmoglobin value. The injection of large amounts of fluid had caused little change, but severe exercise regularly produced hæmoconcentration. A slight but significant diurnal variation had been observed, the values falling until mid-afternoon. It was possible that that variation was associated with the degree of muscular activity. Dr. Walsh said that his results had shown that the mean hæmoglobin value of blood taken from the ear was higher by 1·1 grammes *per centum* than that of blood taken from the vein or from the finger, but the relationship between those values had not been constant. It was suggested that in blood taken from an arm vein those physiological variations were the results of redistribution of red cells and plasma rather than of changes in the total plasma or red cell volume.

Some Physiological Aspects of Serum Iron Values.

I. KALDOR (Sydney), at a meeting of Section N, said that iron was present in serum in the form of a protein complex. The protein part of the complex was a β-euglobulin specifically capable of binding iron. Both the amount of iron bound to the protein (serum iron) and the amount of additional protein available for binding more could be measured colorimetrically. Measurements of serum iron and serum iron bound protein had been performed on serum samples of blood donors and medical students. There was good agreement between the figures obtained and those in the literature. Contrary to other published evidence, the serum iron values of regular blood donors were within the normal range. The pattern described by other investigators for the diurnal variation of serum iron values had been observed in the majority of the subjects examined, but it was not universal. Values of serum iron bound protein were apparently not subject to diurnal variation of the same order as the serum iron values.

The Lymphatic Removal of Blood from the Peritoneal Cavity.

F. C. COURTICE (Sydney), at a meeting of Section N, discussed the removal of blood from the peritoneal cavity. He said that it had been investigated by studying the local cellular reaction and the lymphatic drainage of the peritoneum. The red cells were rapidly absorbed into the diaphragmatic lymph capillaries, and from them they passed into the parasternal lymph channels, to the lymph nodes adjacent to the thymus, and thence mainly to the right lymph duct. After peritoneal injection of whole blood containing 7,000,000 red blood cells per cubic millimetre, the red cell count of the lymph coming from the right lymph duct rapidly rose from about zero to 5,500,000 per cubic millimetre. The red cells emerging from the right lymph duct were intact, and there was no hæmolysis. The macrophages of the lymph nodes became engorged with red cells, but the actual volume of red cells engorged was negligible compared with the volume passing through the nodes. There was no significant difference in the rise in circulating hæmoglobin observed after an intravenous and after an intraperitoneal injection of blood. The red cells engorged by the macrophages of the lymph nodes were rapidly broken down as shown by staining for iron. The iron remained in the macrophages in normal animals for at least twelve weeks. If the animals were repeatedly bled, however, the iron disappeared much more rapidly.

Other Papers on Physiological Subjects.

A series of papers on endocrine and reproductive physiology was presented at sessions held conjointly with Section D. Other subjects on which series of papers were presented were as follows: electrophysiology, fluid and electrolyte balance, and cardio-vascular physiology.

Council Meeting.

At a general council meeting held on August 28, 1952, the Australian and New Zealand Association for the Advancement of Science appointed Sir Theodore Rigg president-elect for its next conference to be held in Melbourne in 1955.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

THE FIRST LIST OF "LEGALLY QUALIFIED MEDICAL PRACTITIONERS" PUBLISHED BY THE MEDICAL BOARD OF NEW SOUTH WALES.[1]

[*The Australian*, March 2, 1839.]

The Medical Board has published a notice certifying that the following gentlemen are duly qualified Medical Practitioners according to the terms of the Medical Witness Bill.

Isaac Aaron, Sydney; Arthur Martin A'Beckett, Sydney; George Bennett, Sydney; William Bland, Sydney; William Brown, M.D., George Thomas Clarke, Penrith; James Cochrane, Maitland; Henry Cowper, County of Murray; Robert Craig, Bathurst; Phipps White Cullen; John Dobie, Sydney; Joshua Dow, M.D., Jerrys Plains; Alfred Obe Edye, Maitland; James Ellis, R.N., Yass; John Gill, Sydney; Robert Gillespie, Sydney; Henry Glennie, Patrick's Plains; Henry Graham, Windsor; Robert Cuthbertson Hope, Campbelltown; Peter Mann Hosking, Sydney; Arthur Huffington, Berrima; Alfred Schomberg Johnson, Goulburn; William R. Kenny, Campbelltown; Thomas Lee, M.D., Sydney; Humphrey Thomas Lewis Lloyd, Parramatta; John Macfarlane, M.D., Sydney; Samuel MacDonald Martin, M.D., Sydney; Duncan McPhee, M.D., Maneroo; James Mitchell, Sydney; Patrick Mollison, M.D., Sydney; Francis Moran, M.D., Sydney; Charles Nicholson, M.D., Sydney; Isaac Scott Nind; Bartholomew O'Brien, Illawarra; Robert Park, Hunter's River; Arthur Savage, R.N., Sydney; Arthur Schouler; David Sloan, Maitland; John Edward Stacey, Port Macquarie; Bute Stewart, Parramatta; Spelman R. Swaine, Campbelltown; Adoniah Vallack, Sydney; Francis Lascelles Wallace, Sydney; Charles Avory Warner, Penrith; John Boucher West, Sydney; Henry Rawes Whittell, Sydney; Stephen Geary Wilkes, M.D., Sydney.

Correspondence.

THE AUSTRALIAN ABORIGINAL AND OURSELVES.

SIR: I do not know if it is customary to criticize editorials, but yours of November 1, 1952, seems so extraordinary that I hope it will be permitted.

If we are considering the merits of Australian aborigines as Australian citizens, then the adventures of a West African native in America seem to have little bearing. Neither does a decrease in the number of full-blooded aborigines. The body of Australian citizens has received additions from many sources, and it has been counted a good thing that these additions have not remained separate and distinct minorities as similar bodies have done in so many European countries.

The problem of racial superiority is surely one which can be discussed scientifically between men of good will without one side being labelled as "vicious liars", though without some agreement as to what superiority is, there is likely to be little profit. Professor Elkin's statement that they are not "inferior beings whose wishes need not be respected and whose 'tribal' freedom is of no account" does not help, because I do not know what is meant by their "tribal" freedom and I do not feel inclined to grant all the wishes of many people whom I do not regard as inferior.

If we wish to know their suitability as full citizens of Australia, it will surely help to consider their past record. Before the arrival of white people in Australia they had done so little to influence their environment that it would be fairer to regard them as fauna than as inhabitants. They had evolved a social system regarded as the lowest in the world. This claim has been challenged on behalf of the Patagonians, who are now almost extinct. Since the white settlement, the aborigines have been unable to defend or maintain what culture they had and in general have proved

[1] From the original in the Mitchell Library, Sydney.

incapable of adapting themselves to the new environment. I expect I shall be abused for saying this. It was the opinion of Mrs. Daisy Bates, in whom spite against the aborigines was not conspicuous, and it is held by many others who are against detribalizing the aborigines and in favour of reservations as the best, though not a perfect, solution.

If, seeking some comparison, we compare the aborigines' contribution to Australian life with that of the convicts we are surely not setting the standard too high; for the latter had been specially and deliberately selected as substandard citizens of a white community, they were fewer than the aborigines, they were a separate class for a shorter time, and they received less tender encouragement. While they existed together, both were voteless classes with much restricted political and social rights. Neither the best nor the worst of aborigines or convicts is typical of the mass, though neither may be "less representative of their people" than the other. In a move to accept the mass as full Australian citizens it is the mass that should be considered. The convicts proved assimilable into a tolerant community whose prevailing philosophy held simultaneously that the citizen best served his country who best served himself and that private vices could be public virtues. How far public thought has shifted in the last century is shown by the modern tendency to demand that the citizen perform his duties to the State—compulsory education, compulsory military service, compulsory voting, compulsory jury service *et cetera*. Can the mass of Australian aborigines become full citizens of such a State with benefit to themselves and the State? That is the question. Conclusive evidence against the proposition can hardly be given, but a probability, strong enough to make a safe working rule, is possible. In short, individuals can be accepted, and are, but the mass cannot.

Yours, etc.,

44 The Avenue, J. B. HOGG.
Nedlands,
Western Australia.
November 13, 1952.

OVERLAYING OF INFANTS.

SIR: The article "Overlaying of Infants" by Dr. K. M. Bowden (THE MEDICAL JOURNAL OF AUSTRALIA, November 1, 1952) is as stimulating and reassuring as have been his previous contributions. There has apparently been only one possible case of overlaying in Melbourne in the past four years. Why therefore does Dr. Bowden state later in his article that "on no account should parents take a baby into bed to sleep with them"? Does this mean that he still has some doubt?

If the post-mortem macroscopic and microscopic findings are as conclusive of death from natural causes as would appear to be the case, then it must be very rare in this country for a baby to die an asphyxial death from overlaying or from excessive swaddling. I wish I could believe that incorrect swaddling, with restriction of shoulder and neck movement, and a large soft pillow were as rarely associated with death as Dr. Bowden's present and previous figures would indicate.

Yours, etc.,

185 Macquarie Street, NORMAN CUNNINGHAM.
Sydney,
November 6, 1952.

ULTRASONIC ENERGY IN PHYSICAL MEDICINE.

SIR: Dr. Ella Chambers should not be surprised that THE MEDICAL JOURNAL OF AUSTRALIA gave the adverse publicity referred to in her letter (THE MEDICAL JOURNAL OF AUSTRALIA, November 8, 1952). Official medical publications in all countries rightly remain conservative and are advisedly influenced with at least some prejudice where new methods are concerned. In this case quite obviously no recognized authority with experience in the subject was available to the editorial staff. Unfortunately the history of medicine holds far too many well-known examples of this prejudice being carried to extremes—to the detriment of scientific advancement. It is not generally well known that in Australia there is no one better fitted to comment on ultrasonics than Dr. Ella Chambers herself.

The Mayo group did not augment our knowledge, their experiments being but a repetition of German research on dogs and lesser fry performed years ago, during the rudimentary stage of ultrasonic experimentation, and run parallel to thousands of other scientific investigations on this unfortunate animal.

After personal experience of the method for one year I have found ultrasonic irradiation a most useful addition to physical medicine and state, without fear of enlightened contradiction, that there is less danger in the proper use of ultrasonics than in allowing the average experienced medical practitioner to prescribe soporifics.

Yours, etc.,

149 Wickham Terrace, JOHN SHANASY.
Brisbane,
November 11, 1952.

THEFT OF EAR, NOSE AND THROAT INSTRUMENTS.

SIR: I have just had a full set of ear, nose and throat instruments stolen with my motor-car; nearly all the instruments have my initials engraved "A.L.C.". There was also a complete endoscopy set, made by Leiter of Vienna. I am writing this letter, hoping you will publish it, so that any member who is offered instruments which fit into the above category, by strangers, may have the opportunity of reporting the matter to the police for investigation.

Yours, etc.,

141 Macquarie Street, A. L. CLOWES.
Sydney,
November 17, 1952.

CONTROL OF CANCER IN WOMEN.

SIR: In the *British Medical Journal* of May 24, 1952, is a leading article on the progress of cancer in which it is stated that one or more of a number of "aggressive characters" may be decisive in prognosis. This is probably true, but there is abundant evidence that early diagnosis is worth far more than the decision of "aggressive characters" in the prognosis of carcinoma.

The writer has made three extensive surveys of cancer mainly from the gynæcological standpoint, and these were made in 1935, 1949 and 1951, and included at one time and another most of the foremost clinics of the United States and Canada, also those of the British Isles and Europe. It has been more and more evident that apart from hormones, isotopes and electronics the treatment of cancer has advanced very little in the past decade. There are improvements of technique, such as Turner's dosemeters for radium, there are antibiotics and transfusions to help the more destructive surgical procedures as are used at the Memorial Hospital, New York, by Dr. Brunschwig and Dr. Pierce, but none the less the countries with the best results are those whose diagnostic facilities make early diagnosis of cancer possible. In fact "stage zero" is now recognized, and in the United States of America it is referred to as *carcinoma in situ*.

First I must quote Professor Muller of Zurich and the figures associated with Zurich, which are the best that one has seen. Here patients are investigated, and many apparently non-malignant patients are screened. The cervical cancer is observed in the early stages by surface biopsy, Papanicolaou's smears, the new type of colposcope, punch and surgical biopsy. Ovarian cancer is only proved by laparotomy, where as much malignant tissue as possible is removed and radium is inserted into the uterus. Testosterone injections are made, and colloidal gold isotopes are injected.

In 1951 much information was given personally by J. V. Meigs of Harvard, Te Linde and Eastman of Johns Hopkins, and clinics visited were those of Lacassagne in Paris, Revoltella in Padua, Bourg in Brussels, Bastiaanse in Stockholm, Schjot Rivers in Oslo, and in London Royal Cancer, St. Bartholomew's, Guy's, Chelsea Hospital for Women, and St. Mary's, Christie Hospital, Manchester, and Royal Infirmary in Edinburgh.

From the point of comparison with Australia, Norway is a country of great advancement. A comparatively poor country after the German occupation and more scattered in its population than we in Australia and, owing to being snow-bound, less accessible, in the main, none the less by sheer hard work and encouragement in early investigation Norway has cancer cure figures which might stagger us in Australia. The bulk of the cases which one saw were stage I

or II, whereas one's own clinics provide mainly cases in stage III or IV.

In Oslo Professor Schjot Rivers has classes of graduates who are paid by the Government to be shown methods of diagnosis. The surface biopsy and Papanicolaou diagnostic methods require the slide to be kept in alcohol and ether, and these are poor for long distance transport, but punch biopsies are readily taken by men who have been shown the method. A doctor from Narvik, about 2000 miles from Oslo, described how he took punch biopsies of every case which was at all suspicious, and these biopsies were flown or carried down to Oslo for a report by a committee of pathologists, who would then telegraph the result to the doctor.

The alarming situation in Australia is that very few general practitioners take punch biopsies, or even surgical biopsies, until the patient is in an advanced state of cancer. Actually one has seen cases of advanced carcinoma who had been under treatment for six months and more, but these cases, during that time, had not had one examination *per speculum*, and therefore early diagnosis was missed. Early diagnosis of these cases is, in the main, dependent upon the general practitioner's investigations. These patients then become an incubus, they have no value to the community, in fact they are largely unfortunate distressing patients who are palliated until death intervenes.

The cure rate in Norway, however, is comparatively good, and these cancer stricken women who are discovered early and are therefore treatable become useful citizens.

From the therapeutic angle one saw encouraging results from isotopes in England and Europe, and the use of electronics in Germany gave an increased feeling of hope.

It is difficult to overlook the old saying that more diagnoses are missed by not seeing than by not knowing, and if our general practitioners would be shown how to help in this direction our cancer results would be improved very much. Demonstration of cervical changes as seen *per speculum* should be made to students and post-graduates if early diagnosis of cancer of the cervix is to be accomplished.

Yours, etc.,

R. FRANCIS MATTERS.

188 North Terrace,
Adelaide,
September 15, 1952.

THE MEDICAL BENEVOLENT ASSOCIATION OF NEW SOUTH WALES.

SIR: May I, through the columns of your journal, draw attention to the Christmas appeal of the Medical Benevolent Association of New South Wales, a copy of which has just been posted to each member of our profession. Increased calls upon our limited income make it highly important that the appeal should meet with a generous response from all.

Yours, etc.,

R. J. WHITEMAN,
President, Medical Benevolent Association of New South Wales.

135 Macquarie Street,
Sydney,
November 18, 1952.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course in Advanced Medicine Suitable for M.R.A.C.P. Candidates.

A COURSE in advanced medicine, suitable for candidates for the April, 1953, examination of The Royal Australasian College of Physicians, will be conducted by the Post-Graduate Committee in Medicine for a period of twelve weeks, beginning on January 12, 1953, provided a sufficient number of candidates is offering. Fees for attendance will be £31 10s. or £2 16s. 6d. per week. Fees are payable in advance, and early application to attend the whole or portion of the course should be made not later than January 7, 1953, to the Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU 5238, BW 7483.

Parts II Diploma Courses.

On January 5, 1953, Parts II of the diploma courses in anæsthesia, gynæcology and obstetrics, laryngology and otorhinology and ophthalmology will begin for approximately twelve weeks, provided a sufficient number of candidates is offering. Applications for enrolment must be made by December 10, 1952, to the Post-Graduate Committee in Medicine.

STUDENTSHIPS FOR POST-GRADUATE TRAINING.

THE Commonwealth Scientific and Industrial Research Organization is offering a number of studentships to university honours graduates. The studentships present opportunities for post-graduate training overseas or in Australia in a wide field of physical and biological sciences. Up to nine overseas travelling studentships and up to fifteen Australian studentships are available, and additional awards may be made in subjects of special interest to the Commonwealth Scientific and Industrial Research Organization. Each studentship will be tenable for two years, and positions may be available in the Commonwealth Scientific and Industrial Research Organization for appointees at the conclusion of training. For training in the United Kingdom students will be given a living allowance of £A550 *per annum*. For training in Australia the living allowance will be £A500 if the student is living at home or £A600 if he is living away from home. A special allowance will be made for married students in the United Kingdom, but not in Australia. The Commonwealth Scientific and Industrial Research Organization will also pay reasonable fares and fees. Full particulars may be obtained from the Secretary (Industrial and Physical Sciences), C.S.I.R.O., 314 Albert Street, East Melbourne. Applications close on December 24, 1952.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, promotions *et cetera* are promulgated in the *Commonwealth of Australia Gazette*, Number 74, of November 6, 1952.

NAVAL FORCES OF THE COMMONWEALTH.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointments.—Peter William Fay and Trevor Nelson Hatfield are appointed Surgeon Lieutenants (on probation), dated 1st September, 1952.

Royal Australian Naval Volunteer Reserve.

Appointment.—John Heaton Simpson is appointed Surgeon Lieutenant-Commander, with seniority in rank of 11th July, 1951, dated 20th December, 1951.

AUSTRALIAN MILITARY FORCES.

Honours and Awards.

3/129123 Colonel Richard Stanley Smibert, O.B.E., Royal Australian Army Medical Corps, has been awarded the Australian Efficiency Decoration.

Royal Australian Army Medical Corps (Medical).

The following officers relinquish the provisional rank of Captain and are transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (1st Military District) in the honorary rank of Captain, 25th August, 1952: QX700167 K. R. Hayes and QX700166 W. D. Gibbons.

The following officers relinquish the provisional rank of Captain and are transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District) in the honorary rank of Captain: NX700389 S. L. Mayne, 26th August, 1952, NX700385 J. I. Davis, 19th August, 1952, and NX700387 D. H. Trousdale, 29th August, 1952.

The following officers relinquish the provisional rank of Captain and are transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (3rd Military District) in the honorary rank of Captain: VX700295 K. C. R.

Leversha and VX700297 J. E. H. Milne, 2nd September, 1952, and VX700292 B. C. A. Stratford, 28th August, 1952. To be Captains (provisionally): NX700393 Richard Harte Keatinge, 25th August, 1952, and NX700395 Francis Michael Stackpool, 27th August, 1952.

The following officers are placed upon the Retired List within Military Districts and on the dates as shown, with permission to retain their rank and wear the prescribed uniform:

1st Military District.—Major (Honorary Lieutenant-Colonel) B. L. W. Clarke, 1st October, 1952, Lieutenant-Colonel (Honorary Colonel) P. W. Hopkins, M.C., Major (Honorary Lieutenant-Colonel) N. M. Gutteridge, E.D., Honorary Major M. Geaney, Captain (Honorary Lieutenant-Colonel) F. W. R. Lukin, Captain (Honorary Major) A. E. Lee and Honorary Captain G. E. L. Marshall, 15th October, 1952.

3rd Military District.—Lieutenant-Colonel (Honorary Colonel) J. M. Blair, O.B.E., Lieutenant-Colonels S. A. McKenzie and C. H. Osborn, Majors L. W. Johnston, K. Mackay, I. Buzzard, C. J. O. Brown and C. G. B. Colquhoun, Honorary Major L. M. Bryce and Captain H. G. D. Cookson, 15th October, 1952.

4th Military District.—Colonel F. H. Beare, C.B.E., E.D., Major T. K. R. Allen, Captains G. J. Gregerson and H. S. Hetzel, 15th October, 1952.

SX700068 Captain (Honorary Lieutenant-Colonel) L. W. Jeffries, D.S.O., O.B.E., is placed upon the Retired List (4th Military District) in the rank of Lieutenant-Colonel and with permission to wear the prescribed uniform, 15th August, 1952.

NX700386 Captain (provisionally) R. G. Rushworth relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (2nd Military District) in the honorary rank of Captain, 12th August, 1952.

To be Captain, 4th August, 1952.—NX700390 Basil John Ireland.

To be Captain (provisionally), 11th August, 1952.—NX700389 Stephen Leigh Mayne.

Citizen Military Forces.

Northern Command: First Military District.

Royal Australian Army Medical Corps (Medical).—The provisional ranks of the following officers are confirmed: Captains 1/39103 E. G. Ahern, 1/39096 E. F. McGuinness and 1/39086 W. H. Tait. 1/39096 Captain E. F. McGuinness is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (1st Military District), 17th February, 1952 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 114 of 1952, promulgated in *Commonwealth Gazette* No. 47 of 1952). 1/39086 Captain W. H. Tait is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (1st Military District), 30th March, 1952 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 98 of 1952, promulgated in *Commonwealth gazette* No. 40 of 1952).

Eastern Command: Second Military District.

Royal Australian Army Medical Corps (Medical).—2/206951 Lieutenant-Colonel E. F. Thomson is appointed from the Reserve of Officers, is appointed to command 1st General Hospital, and to be Temporary Colonel, 15th August, 1952. 2/130106 Honorary Captain H. L. Thompson is appointed from the Reserve of Officers, and to be Captain (provisionally), 30th July, 1952. To be Captain (provisionally), 18th September, 1952: 2/135769 Deryk Willard Lawson.

Southern Command: Third Military District.

Royal Australian Army Medical Corps (Medical).—The regimental seniority of the following officers is as shown: 3/82441 Captain (Temporary Major) D. C. Cowling next after 3/73277 Captain (provisionally) J. W. Bennett, 3/101017 Captain (Temporary Major) B. H. Gandevia next after 3/82441 Captain (Temporary Major) D. C. Cowling, and 3/101815 Captain G. W. Cooper next after 3/101017 Captain (Temporary Major) B. H. Gandevia. 3/101005 Captain T. D. Hollywood relinquishes the provisional rank of Major and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (3rd Military District), 23rd July, 1952. 3/101813 Captain (provisionally) W. H. Coates relinquishes the provisional rank of Captain and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (3rd Military District) in the honorary rank of Captain, 22nd August, 1952. 3/50054 Colonel E. V. Keogh, D.C.M., M.M., is placed upon the Retired List (3rd Military District) with permission to retain his rank and wear the prescribed uniform, 2nd November, 1952. To be Temporary Major, 23rd September, 1952: 3/101017 Captain B. H. Gandevia.

Western Command: Fifth Military District.

Royal Australian Army Medical Corps (Medical).—5/26393 Major L. P. Gray is appointed to command 7th/13th Field Ambulance, and to be Lieutenant-Colonel, 8th September, 1952. 5/32053 Lieutenant-Colonel (Honorary Colonel) F. K. Wallace, O.B.E., relinquishes command 7th/13th Field Ambulance, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (3rd Military District), 8th September, 1952. The age for retirement of 5/32054 Colonel J. H. Stubbe, E.D., is extended until 31st July, 1953. 5/38060 Captain T. Godlee, M.B.E., is placed upon the Retired List (5th Military District) with permission to retain his rank and wear the prescribed uniform, 1st October, 1952.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps (Medical).

1st Military District: To be Honorary Captain, 29th September, 1952.—Robert John Scott.

2nd Military District: To be Honorary Captain, 18th September, 1952.—Kenneth Leslie Collins.

3rd Military District.—Honorary Captains W. J. R. Mabin, M. A. Ingram, A. J. Macleod, I. P. Beattie, W. P. Brennan and V. R. Delaney, and Honorary Lieutenant W. J. Eddy are retired, 15th October, 1952.

4th Military District.—Honorary Captain C. V. Hallett is retired, 15th October, 1952. To be Honorary Captain, 9th September, 1952: Lloyd Kenneth Morgan.

Royal Australian Air Force.

Air Force Reserve.

Medical Branch.

The following former officers are appointed to commissions with rank as indicated: (Squadron Leader) J. N. Diggle (033066), 31st May, 1952; (Flight Lieutenant) D. H. Prentice (051149), 20th July, 1952, W. W. Wilson (434488), 6th August, 1952.

Boyd Robert Buttsworth (297534) is appointed to a commission, 9th July, 1952, with the rank of Flight Lieutenant.

The following Flight Lieutenants are promoted to the temporary rank of Squadron Leader, 1st September, 1952: G. J. Ramsay (265308), K. B. Brown (297510), W. J. Betts (287464), D. E. Copping (297527).

The appointment of Flight Lieutenant G. B. Goswell (267238) is terminated, 19th June, 1952.

Obituary.

GILBERT EDWARD PHILLIPS.

We are indebted to Professor A. N. St. G. Burkitt for the following appreciation of the late Dr. Gilbert Edward Phillips.

On September 12, 1952, at the age of forty-seven years, Gilbert Edward Phillips died of pulmonary embolism following on a secondary melanoma; such was the tragic end of a very gifted man. I propose to outline the outstanding events of his life, followed by an appreciation of his character and a selected bibliography of his publications, as I feel that this latter especially gives a deeper insight into Phillips's mental qualities and breadth of vision.

He was born in Sydney in 1905, and his father and mother and a sister survive him. He was educated at Mowbray House, Chatswood, at the Blue Mountains Grammar School and at North Sydney High School, matriculating in 1922 and entering the university with an exhibition in medicine in 1923. In first year he gained distinctions in botany and zoology and a credit in physics. He obtained credits in second and third year medicine in 1924 and 1925, and then proceeded to take a bachelor of science degree in physiology in 1926, obtaining first-class honours and the university medal. He then continued with fourth year medicine, obtaining a credit, and in 1928 did fifth year medicine and also gained a master of science degree in physiology with first-class honours and the university medal. The subject of his thesis for the master of science degree was "An Introduction to the Study of Iso-Hæm-Agglutination Reactions

of the Blood of Australian Aboriginals". A year or so later he went to New Zealand and studied the blood groups of the Maori and was admitted to kinship of a Maori tribe. He was to visit New Zealand again once more as medical adviser to the Australian team which went to the Empire Games in February, 1950. In 1929 he obtained his final degree in medicine, gaining credit with second-class honours. Among his contemporaries at this time, two later attained professorial rank, namely, Andrew Abbie and Douglas Lee.

In 1936 he took the master of surgery degree and in 1938 became a Fellow of the Royal Australasian College of Surgeons.

While at the university he took an active part in sporting and undergraduate life. He served on the Union board of directors from 1927 to 1930, and later as a graduate from 1934 to 1937, and was a vice-president of the Union in 1935 and 1936 and honorary secretary for two years from 1928 to 1930. In 1925 and 1926 he was honorary secretary of the advisory committee on university life. With a magnificent physique he gained university blues in rowing and swimming and a State blue for rowing. He was a member of the water polo team from its inception and he also won the heavyweight inter-'varsity boxing championship and was captain of the University Boxing Club. He was also president of the Sports Union in 1935-1936 and later in 1951-1952, president of the University Boxing Club in 1934-1935, and a vice-president of the University Boat and Swimming Clubs in 1934-1936. He was also keenly interested in sailing (18-footers), an interest which he maintained to within two or three years of his death, when radium treatment and the subsequent amputation of his foot prevented him from further very active participation. For some years he owned the 40-foot yacht *Siren*. He was also chairman of the house committee of the University Club for a number of years before his death, and was made a life member just prior to his death.

From 1930 to 1934 he worked as a Liston Wilson Research Fellow, first of all in the department of anatomy for one year, and then with the aid of a Rockefeller Foundation Fellowship from 1931 to 1933 he was research assistant to Sir Charles Sherrington, F.R.S., of Oxford, and Professor E. D. Adrian, F.R.S., of Cambridge, publishing work on the sympathetic nervous system, on postural reflex action, on the cochlea, on myotatic reflexes in sympathectomized muscle, and on the perception of flicker in lesions of the visual pathways *et cetera*. He married Ngare Bloomfield in June, 1932, in London during this period. He was also clinical clerk to Dr. Gordon Holmes, F.R.S., at the National Hospital for Nervous Diseases, Queen's Square, London, for six months, and was for twelve months in 1932-1933 surgical assistant to Mr. Hugh Cairns, later Sir Hugh Cairns, at that time at the London Hospital. He was later to come into association with Cairns towards the end of the war and on Cairns's visit to Sydney in 1947-1948, and even as recently as January, February and March, 1952, when he worked at Oxford in Cairns's department.

These years with Sherrington, Adrian, Gordon Holmes and Cairns were the formative years of his life. During them he laid the foundations of a fundamental knowledge of the anatomy and physiology of the nervous system, combined with the best that Queen's Square and Cushing's pupil, Cairns, had to offer. His whole life was dominated by the endeavour to integrate all these scientific and practical disciplines in the service of neurology and neurosurgery.

In 1934, on his return to Sydney, he was made assistant lecturer in surgery in the university and given a full lectureship in 1935 and 1936. This was a condition of the Rockefeller Fellowship. At the same time he was honorary neurological surgeon from 1934 to 1936 at the Lewisham General Hospital and carried out work on the general treatment of head injuries. From this time also until his death he was lecturer in neurology and applied neurophysiology in the department of anatomy. During this period, from 1934 onwards, he was continually carrying out research in the departments of surgery and anatomy and beginning a series of clinical studies which were to continue up to the time of his death. About this time (1934) he completed his work on myotatic reflexes in association with Stuart Morson, then a student, for which they were awarded the Peter Bancroft Prize of the University of Sydney for 1935.

In 1937 he visited England and later America under the ægis of the Rockefeller Foundation and made a tour of the main American neurological centres, some of the results of which he summarized in an article in this journal in May, 1937. He was particularly interested at that time in autonomic nervous system studies related to the surgical treatment of hypertension, and also in the treatment of Ménière's disease. Among others he visited Penfield in Montreal, Bailey, Dandy, Horrax and Naffziger in the United States, as well as Cairns and Geoffrey Jefferson in England.

Coming now to the war years, he was a consultant with the rank of squadron leader in the Royal Australian Air Force just before and during the early years of the war and worked at Richmond, New South Wales. His advice and help were of great value in the formation of an Air Force Research Unit in these early war years; this unit eventually expanded and included two well-developed research centres in the University of Sydney and the University of Melbourne.

In February, 1945, he was called to England by Cairns to join Number 8 Mobile Neurosurgical Unit as a major and was later made lieutenant-colonel and officer-in-charge of the surgical division of the Military Hospital for Head Injuries at Oxford, having transferred from the Royal Australian Air Force to the Royal Army Medical Corps. He took part in the reception of patients with head injuries received after the invasion of Germany. Just after the war the famous American general, George Patton, was injured in a car accident, and Cairns and Phillips were flown to Austria, but found that little could be done for Patton, who had a fracture of the upper cervical part of the vertebral

column. It was just after this that Phillips had the first skin grafts and removal of suspicious looking moles on his right leg, though he had had some premonitory symptoms of possible trouble as early as 1933, when Hugh Cairns removed a pigmented mole from the right ankle. About 1945 he had a recurrence following irritation of the scar, and the area was excised and grafted in 1946. Attempts were made about 1949 to neutralize any possible malignant change around the skin area which had been excised, by further drastic radium treatment. This treatment finally in 1951, however, led to atrophy, and it became necessary to amputate his right leg below the knee. Within six weeks of the amputation he was again operating with the aid of a temporary peg leg and later with a well-fitted artificial limb and a special operating chair. Very soon after this he decided to go to England with his wife and family, three of his four children having just grown up. His main aim was to carry on work on closed head injuries begun in 1945. He passed a very active and fruitful three months partly in London and particularly in Cairns's department at Oxford, as already mentioned, where he spent an intensive six or eight weeks studying data which Cairns and Ritchie Russell placed at his disposal for a thesis on traumatic epilepsy following closed head injuries. At the same time he visited old friends, including Professor Adrian and Sir Charles Symonds, and attended a Ciba Neurological Congress in London, at which such speakers as Lorenté de No and Eccles were present.

In the period 1947-1951 he also was one of those mainly responsible for the establishment of a diagnostic neurological

centre, later to be called the Northcott Neurological Centre, under the ægis of the Returned Sailors, Soldiers and Airmen's Imperial League of Australia. To organize and develop this project he called in the help of Sir Charles Symonds, of London, who, with Cairns, had been largely responsible for the development of a similar centre in England during the war. It was due to Phillips's energy and vision that the centre finally took shape and was formally opened by the Governor of New South Wales, Sir John Northcott, in November, 1951. On his return from England in April, 1952, Phillips immediately commenced a remarkable course of lectures, including not only formal teaching lectures to post-graduate classes, but also a series summarizing his recent experiences and recent work in England and the Continent. These were widely attended and aroused great interest amongst students and the medical profession generally. Then quite suddenly late in July symptoms of a recurrence occurred, and in a few weeks we saw a rapid decline followed by his death on September 12.

Such is an incomplete record of some of the main events of his life. Turning now to his personal characteristics, he was tall and commanding, with a kindly and tolerant manner, but at the same time he had a strong sense of humour. In mentality his outstanding characteristic was clarity of thought and expression, attained not by ignoring detail, but by hard work and careful assimilation of his facts. Another feature was his immense physical and mental energy. He once confessed to me that until a year or so before his death, he had practically never felt really tired, despite long gruelling days of operating and consultations, and neurosurgery is noted for the demands it makes on an operator.

He had a keen interest in a wide variety of subjects, one of his publications being a small brochure on the appreciation of wine, and his zest for living is shown by his interest in the Wine and Food Society of New South Wales, of which he was at one time president. He was himself an accomplished cook and a connoisseur of rare foods and dishes. He was interested in philosophy and had read widely in philosophical literature, particularly that of Whitehead. When he was a young man he was intensely interested in music, and was a good pianist. Indeed his teacher, Laurence Godfrey Smith, was keen that he should take it up as a career, and he very nearly did so. Any record of him would be incomplete which failed to refer to the happiness of his family life and the comradeship with his wife and four daughters.

I do not feel competent to speak with full authority of his professional work, but what experience I had of his operative technique and his diagnostic ability indicated a capacity for attention to minute detail combined with unusual insight and clarity of vision. As a lecturer he was noted for his clarity and capacity for using fundamental physiological knowledge as a basis for clinical studies to a marked degree, and it was he who founded the Neurological Group in Sydney, a small group of those interested in the study of fundamental and clinical research in neurology. He never failed to point out the value to both groups of workers of pooling their knowledge. Lack of coordination of the various aspects of neurology, he used to say, was a distinct weakness to be found both here in Australia and in England, and he made every endeavour to counteract it. The breadth of his outlook is further evidenced by the eagerness with which he unobtrusively helped to introduce new methods of diagnosis, such as electroencephalography. His original interest in this subject started with the pioneer work of Adrian about 1934 while Phillips was in Cambridge. He was largely instrumental in getting the first electroencephalographic machine, in the form of a three-channel Clifton, in the department of surgery in the New Medical School of the University of Sydney in 1940. This machine was taken over for research work by the Royal Australian Air Force almost immediately and worked under Phillips's direction by Dr., later Professor, A. McIntyre. Towards the end of the war the late Geoffrey Trahair was appointed electroencephalographer with newer machines at Royal Prince Alfred Hospital, as a result of Phillips's sponsorship.

Another aspect of his character which Professor Dew has particularly asked me to emphasize was the interest he aroused in younger men and women in the study of neurology. A long list of younger members of the profession owe much to him, both for his inspiration and for the time he devoted to them.

Finally I should remark on the courage with which he faced his death. The decision to have his leg amputated and the cheerful assessment of his own condition and the care with which he attempted to clear up all the loose ends of the various projects and interests of his life before he died show a rare courage. As a token of the appreciation with which he was regarded by so many I cannot do better than quote a letter that I have received from Dr. Robert S. Morison, Associate Director of the Rockefeller Foundation:

> I was greatly saddened to hear of the death of Gilbert Phillips and especially touched to hear that on the very day he died he was so concerned as to dictate the message you relayed to me. I am sure that he has more than discharged any obligation to us by the energy with which he went about making the most of his experience in England and transferring it to his colleagues in Sydney. His devotion to the profession of neurology and medical affairs in Australia should stand as a beacon light to all of us.

I feel that I am voicing the thoughts and feelings of all Phillips's friends both in Australia and abroad when I emphasize the tragedy of his death just when he was near the zenith of his mental powers and normally should have had another twenty-odd years of brilliant effort ahead of him. He had already become one of Australia's leading neurosurgeons, and I confidently believe that he was well on the way to becoming a leading world figure in neurology.

In conclusion, the deep sympathies of his friends must be extended to his wife and children, and to his parents and relations.

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FREDERICK ST. JOHN POOLE.

WE have received from Dr. D. Parkhouse the following appreciation of the late Dr. Frederick St. John Poole.

Frederick St. John Poole was born in Adelaide in 1881, the son of Canon Slaney Poole. He was educated at St. Peter's College and the Melbourne Grammar School. Before being able to start medicine he took a position with Theo Bruce and Sons to finance his medical course, and this stood him in good stead later when he held administrative positions with the British Medical Association. Graduating in 1910, he acted as resident medical officer at the Royal Adelaide Hospital for one year. Starting practice at Clarence Park, Adelaide, he then went to Penola for some years and in 1918 joined Dr. Benson and Dr. Covernton at Alberton, and continued with them till the partnership ended with the death of Dr. Benson in 1939 and Dr. Covernton a few months later. Unfortunately a year or two later ill health overtook St. John Poole which ultimately necessitated his retiring from active work, and the following years saw him become gradually weaker till the end came on August 6, 1952. Throughout, his wonderful disposition never varied, and there was never one word of complaint even though it was difficult for him to speak in a whisper.

In his active life he gave the British Medical Association of his best, being president of the South Australian Branch in 1932-1933 and treasurer for seven continuous years (1933 to 1940), as well as being a director of the British Medical Hall Company and an ordinary committee member on several occasions. These positions entailed much strain and work ungrudgingly given, for it was at the period when lodge agreements were a source of dissatisfaction and argument. Added to this was the worry for all Branches over the first proposed national health scheme by the Government, with its objectionable clauses, which brought opposition from all sides. Fortunately the Branches through the Federal Council

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED OCTOBER 25, 1952.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	..	2(1)	..	..	..	..	..	..	2
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	2(2)	..	..	..	..	..	2
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	..	..	5(5)	..	..	3	..	..	8
Diphtheria	3(3)	..	5(5)	..	11(11)	1(1)	1	..	21
Dysentery (Bacillary)	..	..	3(1)	4(4)	..	..	..	..	7
Encephalitis	..	1(1)	..	..	..	..	..	..	1
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	..	..	..	..	4(1)	..	..	4
Infective Hepatitis	..	1	..	..	17(10)	..	1	..	19
Lead Poisoning	..	..	..	..	1	..	..	..	1
Leprosy	..	..	..	..	1	..	1	..	2
Leptospirosis	..	..	1	..	..	..	..	..	1
Malaria	..	..	..	..	1(1)	..	..	..	1
Meningococcal Infection	3(1)	8(5)	..	1(1)	1	1	..	..	14
Ophthalmia	..	..	..	..	2	..	..	..	2
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	5(4)	5(1)	1	5(3)	..	3(3)	..	..	19
Puerperal Fever	1(1)	..	..	..	..	..	..	..	1
Rubella	..	44(35)	1	..	5(1)	..	..	3	53
Salmonella Infection	..	..	..	..	1(1)	..	..	..	1
Scarlet Fever	14(9)	32(30)	6(3)	2(2)	6(4)	2(1)	..	..	62
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	1	1(1)	..	..	..	..	..	2
Trachoma	..	..	..	..	..	..	..	..	..
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	55(34)	24(21)	17(11)	6(4)	10(4)	4(2)	..	3	119
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	2	..	..	..	..	..	2
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

were able to produce an abortion without legal complications. No one could have had a truer friend in an association which extended over fifty years. The welfare of the profession was always uppermost with him, both collectively and individually. He leaves a widow and two daughters to whom our sympathy is extended.

Dr. C. F. Drew writes: The association of the late F. St. John Poole with the South Australian Branch of the British Medical Association was a long and distinguished one. It was my privilege to be a member of the Council with him for some of the time, and it was principally when we worked together on one of the subcommittees, namely, the Lodge and Ethical Committee, that I was to learn of his sterling worth and of his fighting capacity in all those things which affected the status of the members of the medical profession, and in particular of the general practitioner. He was always a staunch advocate of all those things which in any way affected the ethics of the profession, but it was in the many conferences held to adjust or improve the payments to those members who were engaged in lodge practice that one soon became aware of the soundness of his judgement and his strength of character to conserve and improve the status of such work. On many an evening and even till the small hours of the morning I have sat with him arguing about adjustments and payments with representatives of the various orders of lodges. It was soon learned that he held very definite opinions on fair payments to lodge practitioners, and he would not budge or agree to any variation in such payments which he did not consider fair and equitable. It was in those days that one learned of his worth to the profession as a whole, though possibly some of the then younger members did not quite appreciate to the full how much he was doing for them at the expense of his own work and health. Even from our student days at the University of Adelaide I learned to appreciate his strength of character, so fully justified in the light of his later work for the South Australian Branch of the British Medical Association, and we must all mourn the loss of a staunch friend and an able advocate always striving for the best for the medical profession as a whole.

ISIDORE HUPPERT.

We regret to announce the death of Dr. Isidore Huppert, which occurred in August, 1952, at North Brighton, Victoria.

Australian Medical Board Proceedings.

TASMANIA.

The following have been registered, pursuant to the provisions of the *Medical Act*, 1918, of Tasmania, as duly qualified medical practitioners:

Bates, Sidney Edward Mills, B.M., B.Ch., 1942 (Univ. Oxford).

Bailey, Christopher Bruce, M.B., B.S., 1947 (Univ. Melbourne).

The following has been licensed to practise medicine and surgery in Tasmania for twelve months under the amending *Medical Act* of May, 1951:

Clemente, Giovanni Fausto, Doctor in Medicine, Doctor in Surgery (University of Bari, Italy).

Nominations and Elections.

The undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association: Hamilton, Samuel, M.B., B.Ch., Q.U. (Belfast), 1948, D.Obst., R.C.O.G., 1950, 51 Spofforth Street, Cremorne, New South Wales.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Edgley, Robert Steel, M.B., B.S., 1952 (Univ. Sydney); Fitzgerald, Kevin Joseph, M.B., B.S., 1952 (Univ. Sydney); Rae, James Lyle, M.B., B.S., 1952 (Univ. Sydney); Read, John Robert, M.B., B.S., 1952 (Univ. Sydney); Hogan, Allan Barry, M.B., B.S., 1941 (Univ. Sydney), M.R.A.C.P., 1948; Brandwein, Aniela Teresa, registered in accordance with the *Medical Practitioners Act*, 1938-1950, Section 17 (1) (*c*).

Corrigendum.

In the Congress Number of the journal of October 4, 1952, an error has been made in the report of the plenary session on "Diagnosis and Treatment of the Chronic Cough". In the discussion recorded on page 489, the third speaker was E. R. Trethewie, not L. R. Trudinger as stated. We regret this error.

Diary for the Month.

DEC. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
DEC. 3.—Western Australian Branch, B.M.A.: Council Meeting.
DEC. 3.—Victorian Branch, B.M.A.: Annual Meeting.
DEC. 3.—Victorian Branch, B.M.A.: Council Meeting.
DEC. 4.—New South Wales Branch, B.M.A.: Clinical Meeting.
DEC. 4.—South Australian Branch, B.M.A.: Council Meeting.
DEC. 8.—Victorian Branch, B.M.A.: Executive Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital: all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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